

**THE USE OF MOBILE DEVICES TO IMPROVE TEACHING AND LEARNING IN DISTANCE
EDUCATION IN NAMIBIA**

by

JOY TUJAMBEKA MEAMENO HAMBABI

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SUPERVISOR: PROF. G. VAN DEN BERG

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DECLARATION

Name: **JOY TUJAMBEKA MEAMENO HAMBABI**

Student number: **33225206**

Degree: **MASTER OF EDUCATION**

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I further declare that I submitted the dissertation to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

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DEDICATION

I dedicate this work to my parents, Eino and Cecilia Hauuanga for being a great inspiration throughout my life. To my beloved husband for your support and understanding during my studies, and to my lovely children, Heino and Medilongo for your understanding when I was too busy with my studies to assist you with homework.

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ABBREVIATIONS

CODEL	Centre for Open, Distance and eLearning
COLL	Centre of Open and Lifelong Learning
ICDL	International Computer Driving Licence
ICT	Information and Communication Technology
IMMAP	Interactive Mobile Messaging Application
LMS	Learning Management Systems
MoEAC	Ministry of Education, Arts and Culture
MoHETI	Ministry of Higher Education and Innovation
NAMCOL	Namibian College of Open Learning
NIED	National Institute for Educational Development
NMICT	Namibia Ministry of Information Communication and Technology
NOLNeT	Namibia Open Learning Network Trust
NUST	Namibia University of Science and Technology
ODL	Open Distance Learning
SMS	Short Messaging System
UNAM	University of Namibia
UNISA	University of South Africa

Referencing abbreviations

et al. et alia – among others

ABSTRACT

ODL institutions have adopted the use of mobile devices for teaching and learning. mLearning is an emerging area of distance education that enables lecturers and students to access course content with their mobile devices from anywhere, at any time.

The purpose of this study of limited scope was to determine the use of mobile devices for teaching and learning at Namibian open and distance learning institutions. The study focused on the two public ODL institutions in Namibia, namely, the Namibian University of Science and Technology (NUST) - Centre of Open and Lifelong Learning (COLL) and the Namibian College of Open Learning (NAMCOL). To achieve this, a literature study and an empirical investigation were conducted. A mixed-method research approach was applied and included a research sample of 12 lecturers and 12 students from two ODL institutions. Data were collected through questionnaires and semi-structured individual interviews. The research data were studied, analysed and validated.

The results of this study showed that lecturers and students are making use of mobile devices for accessing the Learning Management System (LMS)/Moodle. Although the lecturers and students displayed positive attitudes towards the use of mobile devices for teaching and learning, very little has been achieved in the effective use of mobile devices. The study identified challenges that hamper the effective use of mobile devices, such as lack of knowledge in mobile applications for teaching and learning, insufficient storage capacity, opening of applications are sometimes slow, screen size of the mobile devices, as well as lack of access to WIFI and limited/no access to electricity. The study proposed recommendations for considerations to the lecturers, ODL institutions and the Ministry of Higher Education, as well as suggestions for future research.

Key concepts: mobile devices, open distance learning

ABSTRAK

OAO-instellings het die gebruik van mobiele toestelle vir onderrig en leer aanvaar. mLeer is 'n ontluikende terrein van afstandsonderrig wat dosente en leerders in staat stel om toegang tot kursusinhoud deur middel van hul mobiele toestelle te verkry, vanaf enige plek en op enige tyd.

Die doel van hierdie studie van beperkte omvang was om die gebruik van mobiele toestelle by Namibiese oop- en afstandslerninstellings te bepaal. Die studie het op twee openbare OAO-instellings in Namibië gefokus, naamlik die Namibian University of Science and Technology (NUST) – Centre of Open and Lifelong Learning (COLL), en die Namibian College of Open Learning (NAMCOL). Met die oog hierop is 'n literatuurstudie en 'n empiriese ondersoek onderneem. 'n Gemengdemetode-navorsingsbenadering is toegepas, wat 'n navorsingsteekproef van 12 dosente en 12 studente van die twee OAO-instellings ingesluit het. Data is deur middel van vraelyste en semi-gestruktureerde individuele onderhoude ingewin. Die navorsingsdata is toe bestudeer, ontleed en gevalideer.

Die resultate van hierdie studie het getoon dat dosente en studente van mobiele toestelle gebruik maak om toegang tot die leerbestuurstelsel (LBS), naamlik Moodle, te verkry. Alhoewel die dosente en student positiewe houdings jeens die gebruik van mobiele toestelle vir onderrig en leer getoon het, is bitter min bereik in die effektiewe gebruik van mobiele toestelle vir onderrig en leer. Die studie het enkele uitdagings identifiseer wat die effektiewe gebruik van mobiele toestelle belemmer, soos 'n gebrek aan kennis van mobiele toepassings vir onderrig en leer, onvoldoende bergingskapasiteit, toepassings wat stadig oopmaak, die beperkte skermgrootte van die mobiele toestelle, asook die gebrek aan toegang tot WiFi en beperkte of geen toegang tot elektrisiteit. Die studie het aanbevelings aan die hand gedoen vir oorweging deur die dosente, OAO-instellings en die Ministerie Van Hoër Onderwys, asook voorstelle vir toekomstige navorsing.

Sleutelkonsepte: mobiele toestelle, oop afstandslern

OKUCASHUNIWE

Izikhungo ze-ODL zamukele ukusetshenziswa kwamathuluzi axhunywa ku-inthanethi ukufundisa nokufunda. *I-mLearning* yindawo evelayo yemfundo yebanga eyenza abafundisi nabafundi bakwazi ukufinyelela kokuqokethwe kwezifundo ngamathuluzi wabo axhunywa ku-inthanethi kunoma iyiphi indawo futhi nganoma yisiphi isikhathi.

Inhloso yalolu cwaningo lobubanzi obunqunyelwe kwakuwukuthola ukusetshenziswa kwamathuluzi axhunywa ku-inthanethi ekufundiseni nasekufundeni ezikhungweni zokufunda ezivulekile nezebanga zaseNamibia. Ucwango belugxile ezikhungweni ezimbili zomphakathi ze-ODL eNamibia, okuyiMfundo Ephakeme yeSayensi noBuchwepheshe eNamibia (NUST) - Isikhungo Sokufunda Okuvulekile Nokufunda Impilo Yonke (COLL) kanye neKholiji Lokufunda Okuvulekile eNamibia (NAMCOL). Kuze kube manje, kwenziwa ucwango lwemibhalo kanye nophenyo olusebenzisa ubufakazi obuqinisekisiwe ukuze kutholakale imiphumela yocwango. Kusetshenzise indlela yocwango oluxubile, olufake isampula yocwango lwabafundisi abangu-12 nabafundi abayi-12 abavela ezikhungweni ezimbili ze-ODL. Imininingwane yaqoqwa ngemibuzo nangezingxoxo zomuntu ngamunye ezihlelwe kahle. Imininingwane yocwango yabe seyifundwa, yahlaziywa yaqinisekiswa.

Imiphumela yalolu cwaningo ikhombise ukuthi abafundisi nabafundi basebenzisa amathuluzi axhunywa ku-inthanethi ukufinyelela ohlelweni lokuphathwa kokufunda (i-LMS), okuyiMoodle. Yize abafundisi nabafundi bekhombisa izimo ezinhle maqondana nokusetshenziswa kwamathuluzi axhunywa ku-inthanethi ekufundiseni nasekufundeni, kuncane kakhulu okuzuziwe ekusetshenzisweni ngempumelelo kwamathuluzi axhunywa ku-inthanethi ekufundiseni nasekufundeni. Ucwango lubeze ezinye izinselelo eziphazamisa ukusetshenziswa ngempumelelo kwamathuluzi axhunywa ku-inthanethi, njengokuntuleka kolwazi lwezinhlelo zokusebenza kwamathuluzi axhunywa ku-inthanethi okufundisa nokufunda, amandla okugcina anganele, ukuvulwa kancane kwezinto zokusebenza, usayizi olinganiselwe wento eyisicaba yethulusi elixhunywa ku-inthanethi, kanye nokuntuleka ukufinyelela ku-WiFi nokufinyelela okulinganiselwe noma okungenawo ugesi. Ucwango luphakamise izincomo ezizocutshungulwa ngabafundisi,

izikhungo ze-ODL noMnyango Wezemfundo Ephezulu, kanye neziphakamiso zocwaningo oluzayo.

Imiqondo esemqoka:

mobile devices

amathuluzi axhunywa ku-inthanethi

open distance learning

Ukufunda okuvulekile kwebanga

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CHAPTER 1

OVERVIEW OF THE STUDY

1.1 Introduction

The world is undergoing a radical change with the worldwide Covid-19, which is forcing individuals to apply social distancing. The pandemic has resulted in all economic sectors (financial, healthcare, education, etc.) to communicate and act differently, and to adopting the use of mobile technology to deliver services. The higher education sector has necessitated the rapid introduction of online modes of teaching and learning, even for academic activities that still require physical applications such as venue-based examinations, to confine studies strictly to online applications. This change has found the world, including the education sector, progressing faster into the Fourth Industrial Revolution (4IR). The 4IR is shaped by the massive infusion of technologies into a wide range of activities, which represents a fundamental change in the way we live, work and how we educate our students. This led higher education institutions to make use of mobile devices as learning tools in educating students in all modes of studies (fulltime, part-time and distance learning).

This dissertation of limited scope focused on mobile learning within the framework of distance learning. The study discussed the use of mobile devices in learning; analysed the reasons and strategies for the use of mobile technologies in learning; and finally, it recommends how mobile devices can be used for mobile teaching and learning for ODL students.

1.2 Background to the study and research problem

Open Distance Learning (ODL) is currently one of the fastest growing fields in education and, like most industries, is greatly impacted by technological changes. Mobile devices have become the most common means of communication with educational benefits, as they play an essential role of extending the opportunities for teaching, learning and research in distance educational institutions. Hiple and Fleming (2005), stating that the

development of communication technologies is moving the traditional definition of distance learning from print materials and synchronous education to digital and interactive education. They further noted that digital technology communication bridges the gap between ODL students and lecturers as the technology carries content of instruction across time, contexts and space, enabling a “two-way communication” (Hiple & Fleming 2005, p. 247), between participants. Higher education institutions are now provoked to cultivate the benefits that mobile devices present such as the flexibility of learning, the ability to work and collaborate with other students at any time, and anywhere. Distance education lecturers and students should capitalise on the advent of technologies to render distance teaching and learning effectively. The multiplicity of mobile devices at the disposal of distance learning institutions should be used optimally to ensure effective service provision to distance education students in the areas of tutorials, assessment and feedback.

Even though the benefits of mobile devices to distance education are well documented in literature (Kaliisa & Picard, 2017), distance education institutions still find it hard to reap the full benefits of mobile devices in the provision of open and distance learning (Magaji & Adelabu, 2014). The effectiveness of the use of mobile devices in Namibian distance education institutions is yet to be established. In ensuring that mobile devices are used optimally to advance the frontiers of open and distance learning, this study explained viable strategies that distance learning institutions can consider to ensure the optimal use of mobile devices for open and distance learning.

ODL institutions in Namibia have also moved into digitalisation, although the institutions have been mainly utilising print learning resources (NOLNeT, 2020). The 2019-2020 Covid-19 pandemic has accelerated the advent of technology in the ODL sector as students were forced to access their course content via technological devices as face-to-face classes were halted due to social distancing. The pandemic has prompted universities to abruptly and comprehensively adopt online learning to help contain the spread of the virus. Higher education institutions in Namibia have been involved in eLearning, so this will not be something new to them, according to Dr Alfred van Kent, the Executive Director of the Ministry of Higher Education, Innovation and Training in

Namibia (NBC, 11 April 2020) in a media briefing on the impact of Covid-19 on higher education. The higher education institutions are making use of Learning Management Systems (LMS) such as Moodle and other technologies such as social networking, class blogs and wikis, podcasting, interactive whiteboards, and mobile devices to offer virtual classes and communicate with students. ODL lecturers and students are used to the traditional tools such as textbooks and papers and their skills in the use of technology are yet to be determined. ODL students in Namibia also find it difficult to explore and take advantage of mobile devices for learning (Karipi, 2019).

Distance education in Namibia has grown into a valued and popular mode of study, because of its flexible and convenient nature of providing access to quality education. ODL institutions in Namibia have realised the benefit of the use of mobile devices and have promoted the use of mobile devices for teaching and learning. In 2018, the Namibia University of Science and Technology (NUST) handed over 80 iPads to students and staff in the Faculty of Health and Applied Sciences, to assist in teaching and learning (NUST, 2018). The University of Namibia (UNAM) introduced a Moodle mobile application that allows students to access all their content and online learning activity on Moodle through the Moodle Mobile Application (UNAM, 2020). The mobile devices were made available to support students to overcome challenges in terms of distance to attend face-to-face classes digitally and for the submission of assignments.

The ODL institutions in Namibia have realised the need to research on the use of mobile devices for teaching and learning, although few research has been conducted in Namibia so far. The only local research that could be sourced was done on the use of mobile devices in schools (Osakwe, Ujakpa, Iyawa & Florich, 2019). It is against this background that the researcher determined how lecturers and students in Namibian open distance education institutions use mobile devices. The researcher also determined the advantages and disadvantages lecturers and students in Namibian open distance education institutions experienced with regard to mobile learning. The researcher proposed a framework that can be used to assist ODL higher education institutions, lecturers and students on how to effectively use mobile devices for teaching and learning.

Based on the above background to the study and research problem, the study revolved around the following research questions.

1.4 Research questions

The main research question that this study addresses is as follows:

How can mobile devices be used to improve teaching and learning in ODL institutions in Namibia?

The following sub-questions will help to address the main research question:

1. How are the mobile devices used in teaching and learning in ODL higher education institutions?
2. What are the advantages and disadvantages of mobile devices in teaching and learning in ODL higher education institutions?
3. What strategies can be used to improve the use of mobile devices in teaching and learning in ODL higher education institutions in Namibia?

The above questions will help the study to achieve the following aim and objectives:

1.5 Aim of the research

The main research aim of this study is to investigate how the use of mobile devices in open and distance education institutions can improve teaching and learning.

The following sub research objectives will help the study to fulfil the aim:

1. Explain the use of mobile devices in teaching and learning in ODL higher education institutions.
2. State the advantages and challenges of mobile devices in teaching and learning in ODL higher education institutions.
3. Suggest the strategies that can be used to improve the effectiveness of mobile devices in teaching and learning in ODL higher education institutions in Namibia.

1.6 Research design

A research design refers to the specification or framework of the procedure to be implemented by the researcher in order to arrive at a valid conclusion about the research.

The research design provides different ways on how to conduct research using a particular methodology. The authors De Vos, Strydom, Schulze and Patel (2011) define a research design as all the decisions made in planning a study. The research design explains also the research paradigm and research approach.

1.6.1 Research paradigm

A research paradigm is a set of commonly held beliefs and assumptions within a research community about ontological, epistemological, and methodological concerns. Such a paradigm constitutes a mental model that influences and structures how the members of a research community perceive their field of study (Johannesson & Perjons, 2014).

The researcher used a constructivist paradigm. A constructivist paradigm states that the knowledge and understanding of people is because of the experience they have gone through (Harasim, 2012). In constructivist studies the researcher's role to the collection of data from individual perspective of participants as information multiple and can vary in a subjective manner. The researcher has chosen constructivist paradigm to learn from the students and academic staff about the use of mobile devices for teaching and learning and to pick up strategies and methods from them. The research paradigms are discussed in detail in Chapter 3, section 3.3.1.

1.6.2 Research approach

This research follows a mixed approach but it is mostly a qualitative approach. The study will make use of an inductive research approach as it would be more concerned about the context in which such events were taking place. Leedy and Omrod (2005, pp. 134-135) are of the view that the inductive research approach is qualitative in nature, which means that the researcher develops a theory or looks for a pattern of meaning based on the data collected. The authors continue to say that the approach to data collection and analysis is methodical but allows for greater flexibility than in quantitative research. Thus, is because qualitative research allows for spontaneous interaction between the researcher and the participant during interviews. The researcher also made use of quantitative research in collecting and converting data into numerical form so that

statistical calculations can be performed and conclusions drawn. Quantitative research was used to provide measurable data and easy to interpret results.

This research is an exploratory study as the researcher is trying to find out “what is happening; to seek new insights; to ask questions and to assess phenomena in a new light” (Robson, 2002, p. 59). Thus, the researcher would like to explain the use of mobile devices for teaching and learning in ODL institutions in Namibia. The researcher also made use of a multiple case study research design, because more than one variable case was selected to develop a more in-depth understanding of the various phenomena than a single case can provide (Mills, Durepos & Wiebe, 2010). In this research, two ODL institutions (COLL and NAMCOL) were selected and participants were surveyed by questionnaires and interviews. The research include sampling, sources and procedures for collecting data, measurement issues and data analysis plans. A case study research design is commonly used for social sciences that investigate a phenomenon within its real-life context (Gall & Gall, 2007, p. 447). In this case, the real-life context is the use of mobile devices for teaching and learning in the two ODL institution in Namibia.

1.7 Research methods

The research methods are the specific processes used to collect information, process the information, and analyse information about a topic (Terre Blance, Durrheim, Painter, 2006). A research method is the process of the various steps that are generally adopted by a researcher in investigating a phenomenon. It is the specific approach, procedures or techniques used to identify, select, process, and analyse information about a topic (Saunders, Lewis & Thornhill, 2002). The research methods explain the proposed population and sampling procedures of participants, data collection instruments used, as well as the data analysis and presentation. These aspects will be discussed below.

1.7.1 Population, sampling and participants

This study will be limited to ODL lecturers and students at the two ODL institutions in Namibia, namely the Centre of Open and Lifelong Learning (COLL) at the Namibia University of Science and Technology (NUST) and the Namibian College of Open Learning (NAMCOL). The researcher had a sample of 24 participants (12 lecturers and

12 students) out of a population of over 3 000 ODL students from the two ODL institutions, that use mobile devices for teaching and learning. This is because the research is a mini thesis and a study of limited scope, thus the sample size is small. Purposive sampling was used to select the sample of distance education students and lecturers at the two ODL institutions who use mobile devices for teaching and learning. McMillan and Schumacher (2006) describe purposive sampling as a technique that selects just those participants who are relevant to the study.

Data collection activities are aimed at gathering good quality data and thus it is important to consider the most appropriate sampling strategy for the research project (Creswell & Poth, 2018:148). For the purpose of the present research study, ODL students and lecturers were identified first, after which prospective participants were identified. The participants in this study were identified through their involvement in the use of mobile devices for teaching and learning. This was important, since the research questions could only be answered by participants with an in-depth knowledge of the use of mobile devices for teaching and learning. In addition, lecturers using mobile devices for teaching and learning were included, since they can contribute to the critical thinking skills they expect students to have. The researcher received a list of students and lecturers from the academic support officer from the institutions who were using mobile devices for teaching and learning. This type of sampling was selected because the participants who are ODL students and lecturers have experience in the use of mobile devices in teaching and learning in an ODL environment. The study interviewed 12 students and 12 lecturers from the two ODL institutions in Namibia.

1.7.2 Data collection instrumentation

The researcher made use of semi-structured individual interviews and questionnaires for data collection. Semi-structured individual interviews were considered suitable for this research study since the open-ended questions provided during the interviews gave participants freedom to respond to questions according to their inclination. Semi-structured individual interviews were used for lecturers. The interviews were held online due to Covid 19 restrictions. Additionally, questionnaires were selected because they provide a relatively cheap, quick and efficient way of obtaining information from a sample

of people. Questionnaires consisted of open-ended and closed-ended questions. Open-ended questions allowed the participants to give free-form answers, while closed-ended questions allowed them the opportunity to answer with “yes” or “no”, or to choose from possible answers. McMillan and Schumacher (2006) state that semi-structured interviews have open questions that are specific in their intent and allow for rich data collection during the investigation, and with questionnaires data can be collected relatively quickly because the researcher would not need to be present when the questionnaires were completed. The researcher conducted interviews first with the lecturers and then submitted the questionnaire to the students. The reasons for the interview first was to get information from the lecturers on the questions to ask the students, for example mobile application for learning, learning activities and the advantages and disadvantages of using mobile devices. The feedback provided from lectures was compared to the feedback from the students.

The researcher did a pilot test for the interview questions and questionnaires. Pilot testing is a rehearsal of the research questions so as to refine the questionnaire with a small number of test participants, before conducting the main study (Saunders et al., 2002, p. 308). They further stated that the three main reasons for pilot testing are to determine the clarity of instructions, how long the questionnaire took, and if the layout was clear and attractive. The pilot test was done with six participants (three students and three lecturers) who were not involved in the final study. The final questionnaire and interview questions was determined by the participants’ responses. The researcher repeated this process until all the research design problems were ironed out. Thereafter the research approach was evaluated and improved.

1.7.3 Data analysis and presentation

Collected data was processed and analysed using mixed method techniques. A phenomenological approach was employed in analysing the data pertaining to lecturers’ conceptions on the use of mobile technologies for teaching and learning in ODL. A phenomenological approach investigates different ways people perceive a phenomenon (Saunders et al., 2002, p. 250). The research data analysis for the semi-structured

individual interviews were done utilising coding, categorisation and thematic analysis to describe and document the lecturer's experiences (McMillan & Schumacher, 2010).

A Google Forms questionnaire was used to collect quantitative data analysis from the students. Thereafter Google Forms saved and organised the results in a spreadsheet with Google Sheets and presented it in bar charts, pie charts, etc. Quantitative research is the process of collecting and analysing numerical data. It can be used to find patterns and averages, make predictions, test causal relationships, and generalize results to wider populations.

1.8 Ethical measures

Ethical considerations refer to the set of standards that researchers should consider before, during and after their research studies (De Vos, Strydom, Fouche & Delpont, 2005, p. 57). The researcher planned and acquired information from participants on the basis of mutual trust following ethical standards of informed consent, right to privacy, and confidentiality.

Ethical clearance was obtained from UNISA (see Appendix 5) at the start of the research. Written permission to conduct interviews in the ODL institutions was obtained from the appropriate authorities. The researcher obtained consent from the participants before conducting the interviews and distributing the questionnaires. Questionnaires did not require participants to identify themselves. The identities of the lecturers and students were kept confidential by the researcher. Information disclosed to the researcher was also kept confidential. Confidentiality requires that research information be kept confidential and only used for the purposes for which it was intended (McMillan, 2007, p. 52). The researcher ensured that the findings of the investigation were presented in a fair and accurate manner.

1.9 Trustworthiness, validity and reliability

This research is of a qualitative and quantitative nature, and thus the concepts should be trustworthiness of findings, and express that in terms of credibility, dependability, conformability and transferability (De Vos et al., 2011).

Quantitative and qualitative data were used jointly in order to show that the research study's findings were credible. The researcher ensured the credibility of the research by presenting the same questionnaire to the same group of participants in collecting different kinds of information from the same questions. Confirmability and dependability were confirmed as the researcher alone was carrying out the research. The trustworthiness, validity and reliability of this study is examined in detail in Chapter 3, section 3.5.

Silverman (2004, p. 283) mentions that the “two essential ideas to remember, while doing quantitative research are to ensure validity and reliability”. Reliability is needed in research as it will ensure consistency across time, across items and across researchers (Saunders et al., 2002). In this research study, the researcher considered the questionnaire instrument to be reliable as there was consistence in the empirical findings made. The authors also assert that validity is the extent to which the scores actually represent the variable they are intended to and moreover, validity is a judgement based on various types of evidence.

1.10 Clarifications of concepts

The following frequently used key concepts are defined in the context of the study, to have a common understanding of the semantics used in this study.

Covid-19: Covid-19 is a disease caused by a new strain of coronavirus. ‘CO’ stands for corona, ‘VI’ for virus, and ‘D’ for disease. Formally, this disease was referred to as ‘2019 novel coronavirus’ or ‘2019-nCoV’ (WHO, 2020).

Mobile devices: any portable, connected technology, such as basic mobile phones, smartphones, e-readers, netbooks, tablets, iPads and computers. The purpose is to obtain learning materials through mobile apps, social interactions and online educational hubs. It is flexible, allowing students access to education anywhere, anytime (UNESCO, 2013).

Mobile learning: learning across multiple contexts, through social and content interactions, using personal electronic devices. Education via the internet or networks uses personal mobile devices, such as tablets and smartphones, to obtain learning

materials through mobile apps, social interactions and online educational hubs. It allows students to access education anywhere, anytime (Bates, 2011).

Open and Distance Learning (ODL): the term open and distance learning is defined as the education system whereby teaching is done by someone who is not at the same place with the learner and whereby a learner studies at his/her own pace (UNESCO, 2002). It is an approach to learning that focuses on freeing students from the constraints of time, space and place while offering flexible learning opportunities (NOLNeT, 2016). ODL is aimed at bridging the time, geographical, economic, social, educational and communication distance between student and institution, student and academics, student and courseware, and student and peers (UNISA, 2018).

ODL institution: an institution, either public or private, mandated to offer open and distance learning programmes (NOLNeT, 2016). ODL institutions as per this study are public institutions in Namibia which offer an open distance learning education system, especially tertiary education level programmes. These are learning institutions that afford students an opportunity to study at their own convenience without them having to be physically present at these institutions.

ODL students: students who are studying without having to be physically present at the institutions on a full-time basis. These students are usually working or committed which hinders them to attend formal education, or are geographically separated from the institution. ODL students communicate with the institution through internet or network devices.

1.11 Chapter outline

The dissertation consists of five chapters as described below.

Chapter 1 provides an orientation to the study that was carried out by focusing on the problem under investigation. The background to the study, problem statement, research questions, significance of study and definition of terms used in the study are provided. The introduction and background point to the benefits and challenges of the use of mobile devices for teaching and learning. This discussion is followed by the formulation of the

aims that are realised in this study and a discussion of the methodology employed in order to answer the research questions. Finally, all the concepts associated with the study were clarified.

Chapter 2 provides a detailed review of the literature related to the use of mobile devices to improve teaching and learning in distance education. First, a description of the ODL institutions in Namibia was provided with the ODL policy and the ITC policy in Namibia. Consequently, the literature reviews the use of mobile learning in higher education. A distinction was made on the use of mobile devices for administration and the use of mobile devices for teaching and learning in higher education institutions. The literature review on the benefits and challenges of mobile devices for teaching and learning was also alluded to. Finally, a detailed account of the theoretical framework is introduced and describes the theory that informed the research. The theoretical framework is based on four elements, namely theories of learning, generic mobile environment, mobile learning context, and learning experience and objectives.

Chapter 3 focuses on the details of the research design and methods used in this study. It presents the discussion of the methodological and research design aspects that were used to carry out the empirical investigation. The chapter provides justification for the empirical research and a description of the research design and method, sample and sampling procedures, data collection and analysis procedures used in this study. It elaborates on the qualitative approach supported by quantitative data collection methods and analysis of data. The discussion of the research methods also includes measures that ensure trustworthiness, validity and reliability and the ethical measurements of the study.

Chapter 4 describes the representation, interpretation and findings of the results. The elements of data analysis include the biographical data and the topics of the interviews and questionnaires. This chapter presents the data collected from semi-structured interviews and questionnaires. The chapter reports on data collected from 12 lecturer participants by means of online interviews, and 12 student participants by means of online questionnaires. The chapter reveals and summarises the findings in topics and sub-topics related to the research questions, and the questions asked in the interviews and the

questionnaire.

Chapter 5 summarises the findings of the study, and presents the overall conclusion as well as revealing the recommendations of the study. The chapter begins by providing a summary of the literature review and the empirical study and then provides a synthesis of the research findings. The chapter provides relevant recommendations and proposed frameworks with regards to the use of mobile devices at the ODL institutions. The conclusions of the study, as drawn from the research questions, as well as the aims and objectives, are presented. The researcher concludes the chapter by providing suggestions for further research, while acknowledging the limitations of the study.

1.12 Conclusion

The world is undergoing a radical change with the worldwide Covid-19 which is forcing individuals to socially distance. Higher education institutions and open and distance learning institutions were forced to adapt to online and remote learning because no face-to-face classes were allowed. ODL students were making use of mobile devices to access the course content, participate in activities and assessments. The use of mobile technologies in ODL higher education institutions in Namibia has not been fully integrated, although the benefits have been alluded in the research. This chapter contains the overview of the most important aspect of this study.

This chapter also explained the background as well as the context of the study, and the possible contributions the study makes to the ODL higher education institutions. The significance of the study is explained in detail as well as why the scope of the study is important. It is hoped that the study may have the potential to add to the theoretical body of knowledge that is already part of the study. In addition, the study is informed by the aims and objectives of the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Distance education and technologies are considered inseparable, and in order to reach students at a distance, one must use certain tools or technologies to do so (Aoki, 2012). Mobile devices have become the most common means of communication and for this reason, play an essential role in extending opportunities for teaching, learning and research in distance educational institutions. According to Daichendt (2018), mobile technologies are electronic devices that are portable and perform a wide variety of “tasks”. For this research, the term mobile devices will be used to include devices such as smartphones, tablets and iPads. According to Kaliisa and Picard (2017), the functions vary from calling and SMS texting, to the more advanced use of mobile and smartphones for pedagogical purposes. Pedagogical activities include engaging with content, planning and assignment group work, searching for materials and accessing assessment records, as well as taking part in eLearning platforms such as discussion groups, wikis and blogs. The literature review focuses on the mobile devices in ODL higher education institutions in Namibia, the benefits and challenges of using mobile devices in ODL higher education institutions, as well as the theories that underpin the use of mobile devices in education.

2.2 ODL in Namibia

Open and Distance Learning (ODL) in Namibia has grown into a valued and popular mode of study, because of its flexible and convenient nature of providing access to quality education (NOLNeT, 2020).

Namibia has four publicly funded institutions that provide ODL programmes. This study will only focus on two institutions, namely the Centre for Open and Lifelong Learning (COLL) at the University of Science and Technology (NUST) and the Namibian College of Open Learning (NAMCOL). The other ODL institutions are the Centre for Open, Distance and eLearning (CODEL) at the University of Namibia (UNAM), and the National Institute for

Educational Development (NIED), a directorate within the Ministry of Education, Arts and Culture (MoEAC) (2020) in Namibia. CODEL operates as a dual-mode Centre at UNAM with over 6 000 registered distance and online mode students. NIED used to provide ODL programmes to teachers, but currently it only focuses on spearheading the reformation and development of Basic Education in Namibia (NIED, 2020).

The two ODL institutions involved in this study (COLL and NAMCOL) are offering education in the five generation of distance education. The fifth generation, is the Intelligent Flexible Learning Model based on the interactive nature of the Internet (Aoki, 2012). This model provides students with a valuable, personalized pedagogical experience at noticeably lower cost than traditional approaches to distance education and conventional face-to-face education (Burns, 2011). This means that the ODL institutions in Namibia still make use of the first, second, third and fourth generations of distance education. According to Burns (2011), the first generation uses mainly print technology and is known as the correspondence model. The second generation is a multimedia model based on print, audio and video technologies, while the third generation is the tele-learning model based on applications of telecommunication technologies to provide opportunities for synchronous communication. The fourth generation involves the Flexible Learning Model based on online delivery via the internet (Aoki, 2012). This model enables student-teacher interaction at a distance and for students to collaborate in learning anywhere at any time, for example through electronic mail (e-mail), computer conferencing and bulletin boards as used in this model (Burns, 2011). Institutions are mainly utilising print learning resources through printed study materials as well as provide course content in the form of animation to their TV programmes or radio stations and offer computer assisted courses like International Computer Driving Licence (ICDL) (NOLNeT, 2020).

The ODL institutions in Namibia are also offering online courses albeit on a smaller scale. According to the directors of the three ODL institutions in Namibia, Dr Möwes (COLL), Dr Beukes-Amis (CODEL) and Dr Murangi (NAMCOL), the ODL institutions are offering online options for a few courses and programmes, and at the same time, are issuing printed study guides for courses not offered fully online (NOLNET, 2020). To encourage the offering of online courses, COLL and NUST have integrated the use of iPads for third-

year students in teaching, learning, and assessment in the Faculty Health and Applied Sciences (NUST, 2018). COLL and CODEL students are also required to submit their assignments online through the Moodle Learning Management System (LMS). The reasons for the institutions to use print is because some lecturers and students are not open to changes, and thus, there is resistance from lecturers and students to make use of only fully online courses (NOLNeT, 2020). It further stated that some of the students do not have access to technology such as WIFI and compatible mobile devices to make use of fully online courses.

With the outbreak of the Covid-19 pandemic in 2020 over 90% of the world's student population was out of school (Kanwar, 2020). Universities and schools were closed and only limited operations were allowed for essential staff members as appropriate measures to protect the health of students and staff. Distance and online learning have become the only means for educational institutions to keep the doors of learning open (COL, 2020). Namibian institutions migrated to remote teaching, learning and assessment for all students. Remote teaching allowed lecturers to communicate with students outside the physical classroom through technology, such as video conferencing software like ZOOM, Microsoft Teams, and others, discussion boards or learning management systems. COLL, CODEL and NAMCOL were forced to stop printing study guides and to provide students with electronic copies of study guides on the Moodle platform. During the pandemic the ODL students' classes were offered online through ZOOM, Microsoft Teams and all assignments were submitted online. Tests were also administered online. Examinations were suspended for 2020 and students were graded according to their continuous assessment.

The Namibian ODL institutions have realised that distance and online learning have become the only means for educational institutions to keep the doors of learning open (Kanwar, 2020) during the Covid-19 pandemic. These institutions made use of technologies to communicate with students. The benefits of the use of mobile technologies have become visible due to its inherent flexibility, and that this might become the new technology to use for ODL institutions in Namibia.

2.2.1 ODL policy in Namibia

The ODL policy in Namibia was developed with a vision for ODL institutions to provide everybody with equitable access to ODL programmes and opportunities for lifelong learning. The ODL institutions' mission is to develop, support, coordinate and maximise resources to provide quality, inclusive, flexible, relevant, innovative and sustainable ODL programmes and services (NOLNet, 2016).

According to NOLNet (2016) the ODL policy of Namibia objectives is to increase appropriate physical facilities, ICTs and develop human resources in ODL institutions. The purpose is to ensure that teaching and learning takes places effectively through communication, interaction and sharing of knowledge between learners and lecturers to achieve the expected learning outcome. The ODL institutions are also to increase sustainability through strengthening the collaboration with national ODL providers and key stakeholders. Thus, improving the efficiency and effectiveness of the Namibian education sector and promoting economic growth and equity (Nekongo-Nielsen, Möwes, Murangi, Beukes, Bennett, 2008). The ODL institutions integrate ICTs, media, instructional resources and mobilise financial and human resources for the delivery and implementation of ODL programmes (Karipi, 2018).

2.2.2 Information Communication and Technology (ICT) policy in Namibia

The Namibian government's Vision 2030 document stipulates that ICT must be the most important sector in the economic development of the country by 2030 (NMICT, 2009). Core to the achievement of this vision is a demand-driven need to transform Namibia into a knowledge-based economy. The ICT policy supports Vision 2030 and National Development Plans. The policy states that the government should stimulate the development of the ICT skills through the establishment of ICT Centres of Excellence at centres of further learning. The Namibian government should allocate funds toward the development of these centres (study centres and laboratories) at tertiary level and where possible, the government will form partnerships with industry to develop ICT skills in Namibia (NMICT, 2009). The ICT policy statement also reads that the Namibian government will include IT training as part of the educational curricula, starting from primary school level. The government aims to facilitate the establishment of institutions

of ICT learning in smaller towns (NMICT, 2009). The Namibian government has not yet fulfilled any of the above promises regarding the establishment of ICT Centres of Excellence, or allocated funds toward the development of the centres and the establishment of institutions of ICT learning in smaller towns. This resulted in ODL students in higher education experiencing lack of internet access, slow speed of computers, poor working condition of computers, etc.

2.3 Mobile learning (mLearning) in higher education

mLearning is the follow-up of eLearning and originates from D-Learning (distance learning) (Bora & Dhumane, 2012). mLearning is the delivery of education to students who are not able to attend face-to-face or who prefer to use mobile device technology for learning (Mentor, 2016). Given the growing fusion of mobile technologies into ODL institutions, it becomes necessary that lecturers and students are well versed on how to capitalise on the benefits that come with such technologies. Higher education institutions use mobile devices to communicate with students on administrative issues, and for teaching and learning.

2.3.1 The use of mobile devices for administration

Students enrolled at a distance education institution have a frequent need for information from their institutions about timetable changes, assessment deadlines, feedback from tutors and other urgent administrative details (Gill, Stewart, Treasure & Chadwick 2008). At the same time, ODL institutions have a frequent need to provide information to their students about timetable changes, assessment deadlines, feedback from tutors and other urgent administrative details (Gill et al., 2008). Students nowadays have sophisticated mobile devices, which they use to communicate with institutions regarding administrative queries. If a lecture, or similar activity, has to be cancelled at short notice institutions can make use of SMS (Short Messaging System), notices, or WhatsApp group messages to communicate with the students. It is then assumed that all of the students will receive and read the messages, no one will turn up, or be inconvenienced and the institution's administration will have been successful.

2.3.2 The use of mobile devices for teaching and learning

mLearning enables lecturers and students to access the resources for teaching and learning on their mobile devices. Lecturers and students can learn and teach anywhere using the learning materials on their mobile devices (Sølvberg, & Rismark, 2012). There are many mobile applications that students can use to improve their learning experiences (Sølvberg & Rismark, 2012), but students use mobile devices for educational purposes to access content and access video-streamed lectures. However, they do not utilise all the mobile applications to their fullest potential (Beukes-Amiss, & Haiping, 2020).

Various higher education institutions and ODL institutions have researched and introduced mobile applications to improve student learning in higher education. According to Gan and Balakrishnan (2017A), an interactive mobile messaging application (IMMAP) was researched and used as a test by higher education students. The IMMAP allows students to communicate in an intuitive way with the university in a similar way as using WhatsApp and Facebook Messenger. This application is built into the university website and allows students to text message, exchange information with the lecturer or an administrative staff member (Gan & Balakrishnan, 2017B). The research found that IMMAP improved students' interaction in the classroom and provided more responsibility to students in the construction of their learning. Gan and Balakrishnan (2017B) further stated that the classroom alerts mobile application allows students to keep up-to-date wherever and whenever they wanted to. ODL students are working full-time and most have family responsibilities and therefore, mobile devices enable students to be notified on course content uploaded and to keep updated with their courses.

Wilson and McCarthy (2010) reviewed experiences at Ryerson University Library in Toronto, Canada, in the creation of mobile applications for the university's campus. The authors show how library services can be adapted to the mobile environment and how the library can play a role in broader campus mobile initiatives. To remain relevant with new technologies, it is important that libraries adapt their services to this new environment.

Lim, Fadzil and Mansor (2011), and Viljoen, Du Preez and Cook (2005) describe the successful implementation of mLearning via the SMS initiative. This SMS initiative

enables universities to reach out to students outside conventional communication spaces, and it helps keep students connected to the university, their peers and their tutors. Another mobile application is the 'Hotseat' social networking-powered mobile web application developed by Purdue University (Purdue University, 2009). This application allows students to post messages to Hotseat using their Facebook or Twitter accounts or logging in to the Hotseat website. Hotseat allows students to collaborate and allows lecturers to adjust the course content, improve the learning experience, and provide real-time feedback (Purdue University, 2009).

Another mobile app is Blackboard Mobile Learn, many HEI use this. Blackboard Mobile Learn is an application created by Bond University in Australia and is used on mobile devices such as iPads, iPods and iPhones, as well as other smartphones (Kinash, Brand & Mathew, 2012). This mobile application enables students to access their subject sites, post to discussion forums, submit assignments and participate in all other activated information and communication tools by using their mobile devices (Kinash et al., 2012).

The Open University of Catalonia enhanced the learning experience of students, reduced time used for mechanical tasks, and provided better classroom tools by using a Guixa mobile application (COL, 2014). This application allowed lecturers to facilitate the explanation of difficult concepts via video and made it an easy way to create, record and publish videos. COL (2014), list Microblogging as another mobile application used by the Open University of Catalonia. This mobile application is used for various purposes, such as to share links and information, reduce the feeling of loneliness, and improve classroom environment dynamics (COL, 2014).

According to Koper (2005) effective lecturing with mobile devices requires lecturers to organise teaching into five main aspects of firstly, designing or planning the learning activities that will be enacted and coordinated related to the areas of instructional planning and design. This is known as learning design. Secondly, lecturers need to regulate the processes of learning and teaching in order to maximise outcomes on a variety of fronts (Buabeng-Andoh, 2012). Thirdly, the lecturers need to design content in sizes that are small, which will allow students to be flexible in interacting with learning activities. Furthermore, lecturers should include sample videos in the content. This will cater for the

different learning styles of students (Lieberman, 2019). Lastly, the lecturer's presence, skills, knowledge, attitudes and rapport in interacting with the students is important to achieve participatory learning from students (Koper, 2005). The literature above shows that there are many uses for mobile devices for teaching and learning in higher education and specifically ODL. In the next section, the benefits and challenges of using mobile devices in higher education institutions and ODL institutions will be discussed.

2.3.3 Benefits and challenges of using mobile devices for teaching and learning in ODL

Namibian ODL institutions have realised the benefits of using mobile devices for teaching and learning, although this comes with its own set of challenges (Karipi, 2018). There is limited research done on the use of mobile devices for teaching and learning in ODL in Namibia. Most of the research performed was on the use of mobile devices for teaching and learning in schools. The following benefits of mobile devices for teaching and learning in higher education institutions and ODL has emerged.

Research shows (Osakwe, Dlodlo, Jere, 2017) that lecturers in Namibia use mobile devices for teaching, because they are flexible in realising that learning is not predetermined and content can be presented in a form of videos and other multimedia formats (Osakwe, et al., 2019). They further stated that teachers in Namibia access content of school subjects on their mobile devices ubiquitously. Their research also determined that lecturers benefited from the collaboration of interacting with other lecturers both within and at other institutions using mobile devices. According to Karipi (2018) in research done of NAMCOL, students and lecturers indicated that one of the benefits of using mobile devices in teaching and learning is that students can access the course content and learn anywhere and at any time. At UNAM students have access to mobile devices because 75,4% of students' own smartphones to connect to the university Learning Management System (Moodle) and other technologies (Beukes-Amis & Haipinge, 2020)

Other research shows that the benefit of mobile devices is they are small and portable and students can carry them everywhere (Bates, 2015). Kinshuk (2004) indicates that mobile devices can improve the learning process by adapting course content presentation to students from different learning styles, especially visual learning, since it causes

content to be presented in audio, video, and images (Jandhyala, 2017). Mobile devices make use of the latest technologies to bring an interactive learning environment into traditional learning and teaching activities, thus modernising learning (Mohamed, 2014). Mobile devices can serve as support mechanisms for communication purposes between students and lecturers, making information available instantly (Liu & Guo, 2017).

It is clear that mobile devices have abundant benefits to distance teaching and learning. It is thus significant to investigate the use of mobile devices in ODL institutions, and explain how mobile devices can be optimally utilised to the benefit of ODL. Except for the advantages, it is evident that using mobile devices for teaching and learning comes with its challenges.

According to a study by Beukes-Amiss and Haipinge (2020), 59.4% students preferred face-to-face traditional classroom compared to 35.1% students who preferred online learning and 5.5% students who preferred a blended approach. Their research also indicated that 57.6% of the students preferred to use laptops compared to 26.2% students who preferred to use smartphones, their reason being that laptops have more functions than smartphones. Karipi (2018) indicate that some less privileged ODL students do not have smartphones, electricity and access to the internet. This result in students not accessing course content online or communicating to the lecturers. Further research indicated that, some of the lecturers do not have mobile learning pedagogical skills to teach using mobile devices (Karipi, 2018). The researcher has also noted that Namibian ODL institutions have a poor technological infrastructure due to a lack of policy frameworks to inform the use of mobile devices in institutions. The lecturers and students do not use devices because of either a lack of time, a lack of ICT skills or a lack of awareness, the researcher also noted. This result in lecturers and students not using mobile devices for teaching and learning.

Research has indicated that the challenge of mobile devices is that some of the devices have limited storage capacity (Choose Ltd, 2021). They added that this limits the amount of learning content that can be stored on the device, which results in students having to acquire other technologies to supplement the current device, which can be costly. Furthermore, the screens of some of smartphones are very small, thereby compromising

visibility and legibility of the learning content being displayed (Skillshub, 2017). Another challenge is that the speed of mobile devices is sometimes slower than that of a laptop and thus it is time consuming (Schreurs, 2014) and thus delays the learning time as the information needed for teaching and learning may not be retrieved as quickly as required. Against these challenges, it is essential to create strategies that will ensure that the advantages of mobile devices outweigh the challenges, and that mobile devices are used optimally to the benefit of distance teaching and learning. Creating strategies to enhance effective use of mobile devices and offset the established challenges, forms part of the intent of this study.

It is against this background that the researcher discusses the theoretical framework of the study on how to improve the use of mobile devices for teaching and learning in ODL institutions.

2.4 Theoretical framework

A theoretical framework is “a structure that guides research by relying on a formal theory ... constructed by using an established, coherent explanation of certain phenomena and relationships” (Ahmad, Shah, Latada, Wahab, 2019). Sacred Heart University Library (2020) states that the theoretical framework assists the researcher to identify the key variables, which influence a phenomenon of interest. Thus, the theoretical framework alerted the researcher to examine how those key variables might differ and under what circumstances. There are many theoretical frameworks used in research on mobile devices, but the focus was on teaching and learning in ODL institutions. For this reason, the Mobile Learning Design Framework for Lifelong Learning was used for this research. The Mobile Learning Design Framework for Lifelong Learning is designed based on five elements, namely theories of learning, generic mobile environment, mobile learning context and learning experience and objectives (Parsons, Ryu & Cranshaw, 2007). The model is indicated in the figure below.

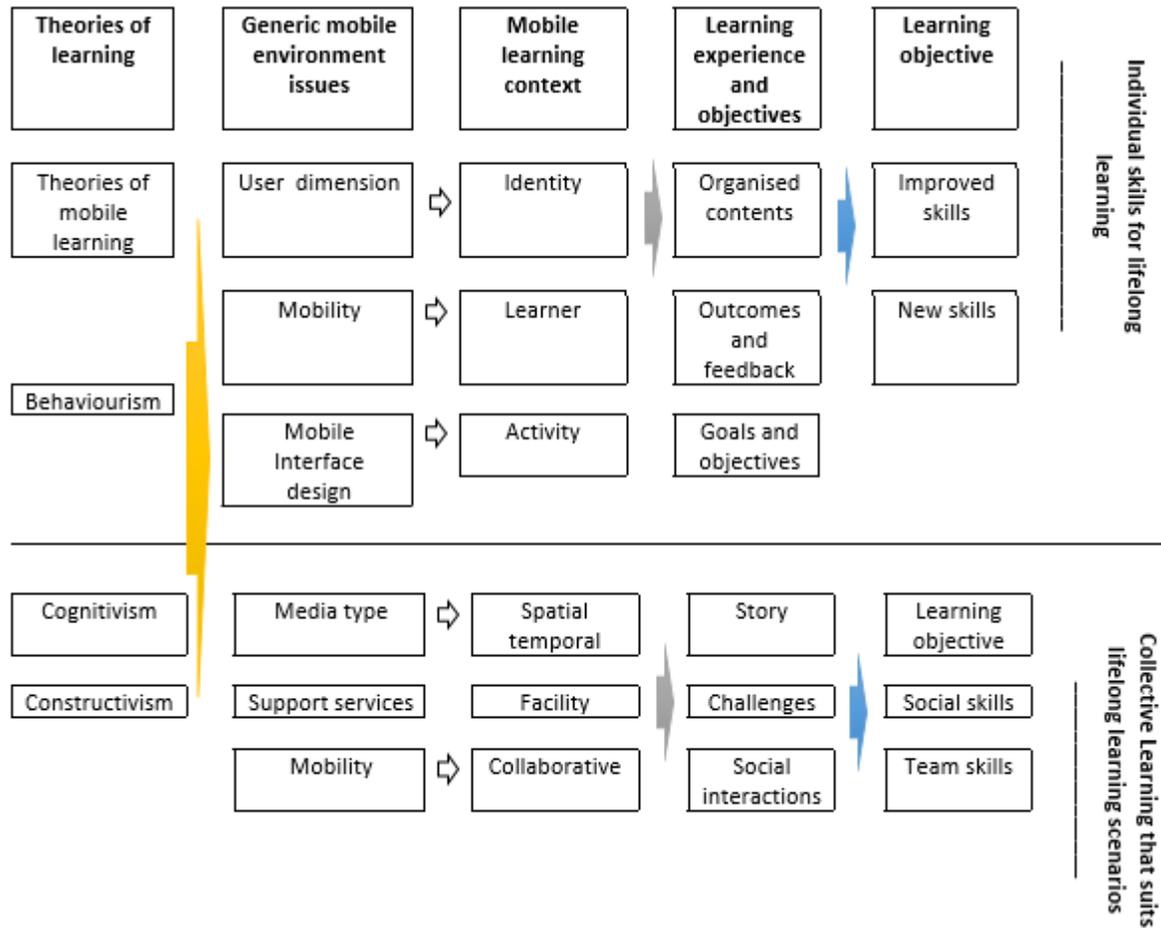


Figure 1: Mobile Learning Design Framework for Lifelong Learning (Parsons et al., 2007)

The first element in the mobile learning design framework is the theories of learning, which have played an important role in the design of instructional materials (Parsons et al., 2007). The theories to be discussed are behaviourism, cognitivism, constructivism and connectivism. These theories were selected as they have an influence on the way lecturers teach and on students' learning behaviour. The behaviourist learning theory is a systematic approach to understanding the behaviour of humans (Araiba, 2019). This theory assumes that behaviour is a reflex evoked by the pairing of certain antecedent stimuli in the environment. Lecturers can make use of a drill and practice exercise, as it is a characteristic of behaviourism, when using mobile devices because feedback is almost immediate. The feedback itself can act as a motivator to the students hence encouraging them to continue with the exercises given (Parsons et al., 2007).

According to Anderson (2008), the cognitivist learning theory states that students learn from connecting information already stored in the brain, with new information. He further stated that the mind is seen as an information processor as it connects information from experience and the environment stored to information received and organised. He also alluded that cognitivism was developed in response to behaviourism. Learning takes place when the brain processes information and transfers knowledge from short- to long-term memory. The facilitator is the organiser, attention getter, so that the student can store the information in short term memory (Harasim, 2012). Thus, the brain processes information, stores it, locates, and produces responses to the content of information, thus constructing new and evolving content. According to Salmon (2014), a cognitivist, content and activities in higher education can include charts and diagrams within the context of well-organised study materials. This theory requires students to be challenged in learning content without necessarily having prior knowledge of it (Salmon, 2014). This is because students rely on new information to be linked to prior knowledge and concepts to be well organised. Given the fact that mobile devices can access a wide range of information, students will be advantaged to have at their disposal of a wide range of information that can trigger their cognitive potentials to act on the information they retrieve with their mobile devices. The new information available on the mobile devices and the students' 'willingness to act on it will ultimately increase students' curiosity to learn' (Anderson, 2008, p. 19).

According to Salmon and Wright (2013) the constructivist learning theory states that students learn through being actively engaged. They further stated that students learn by creating their own knowledge based on experience, active engagement with activities, and collaboration between lecturers and fellow students. This means that students can recall content from experiences and connect it to new ideas, usually through collaborating with other students. According to Taber (2006), constructivism assumes that all knowledge is constructed from the student's previous knowledge, regardless of how one is taught. Thus, students taking part in a lecture require effort to construct new knowledge. Constructivism is one of the most used current learning theories and is linked to the theory of autonomy and independence, as well as the theory of interaction and communication (Taber, 2006). The theory of autonomy states that students' have the capacity to do

independent learning and the theory of interaction and communication states that students learn through collaboration with other students (Sherow & Wedemeyer, 1990). On the other hand, the theory of independence means that students are able to study on their own; they do not need help from others, while constructivism is linked to post-Fordism as learning takes place in a real-world environment. Activities of constructivism include individual discussion, group discussion, taking part in wikis and blogs, reflection at the end of the week, as well as quizzes throughout the week with an informative feedback device (Harasim, 2012).

According to Harasim (2012), the constructivist learning theory requires from students to bring their personal prior knowledge and experiences to the learning situation. Learning in this environment is controlled and mediated with tools, resources, experiences, and contexts to help in the construction of knowledge in different ways (Harasim, 2012). Learning in this environment occurs also through a process of old mental models that are challenged to create new ones through an active and reflective process. Reflective process includes the doing, analyses, adaptation and repetition. Social interaction between students and facilitator provides numerous perceptions to create knowledge (Harasim, 2012). Mobile devices were instilling creative skills among students to explore a wide range of learning opportunities available in the devices, such as the applications that students can download onto their mobile devices to design new shapes, design quizzes and other instructional tools (Bates, 2015). These applications will make students constructivists and interpretivists of their own knowledge, thus being autonomous and independent.

However, connectivism is also currently the most used learning theory in higher education (Salmon, 2014). It involves students learning using technology. This theory states that students learn through a network with others (Salmon, 2014). The network can include the facilitator, fellow students, family, etc. within an individual, and across the networks of students. Thus, connectivism explains how students learn, using connections on the internet. Technologies have created new opportunities for students to learn and share information on the internet and among fellow students. Connectivism is therefore based

on the neo-Fordist system that students or facilitators (Salmon, 2014) can create learning and knowledge.

Salmon (2014) continues by saying that a key feature of connectivism is that much learning can happen across peer networks that take place online. This theory is relevant to this study, as mobile devices enable lecturers and students to communicate through sharing of information and answering questions as needed. Students are also encouraged to seek out information online on their own and share their findings with one another.

The second element of the Mobile Learning Design Framework for Lifelong Learning is the generic mobile environment, which raises the issues of the user dimension, mobility of the device, mobile interface design, media types and support services (Parsons et al., 2007). The generic mobile environment collects demographic data from the students and lecturers involved in the teaching and learning environment (Parsons et al., 2007). The data are used to determine the students and lecturers' mobility of their mobile devices and establish the support services. Data collected can include the mobility of users and the devices, user interface (small screen) and the design of the interface. The third element is the mobile learning context that encourages collaborative activities between students and students, students and lecturers and students and other sources (Parsons et al., 2007). Mobile learning has one distinctive feature and that is the encouragement of collaborative activities through discussions, debates, and more. Last is the learning experience and objectives element that looks at the student experience and the usability of the mobile device. Elements such as enjoyment, user satisfaction and motivation are taken into account. Thus, lecturers are encouraged to organise the content to benefit the students' experience. Activities should be designed in such a way that they possess competitive elements that might be more interesting to the students. Lecturers are also encouraged to indirectly insert the fun element into the materials designed (Prensky, 2001).

2.5 Conclusion

The purpose of this chapter was to highlight the different uses of mobile devices for teaching and learning in higher education and ODL institutions as well as the benefits and challenges thereof. The literature review indicated that distance education and technologies are considered inseparable, as in order to reach students at a distance, one must use certain tools or technologies to do so. Various ODL institutions have created mobile applications like Blackboard Mobile Learn, interactive mobile messaging applications, SMS initiatives, and many more, for students to access their course content. The chapter reviewed the literature on a Mobile Learning Design Framework for Lifelong Learning with the aim to see the benefits it has on the lecturers and ODL institution.

In this chapter, the ODL institutions in Namibia namely, COLL, NAMCOL, CODEL and NIED were discussed and their offering of education explained. With the outbreak of the Covid-19 pandemic all the ODL institutions in Namibia have move to online learning for teaching, learning and communicating with the students. The use of mobile device has increased rapidly during this time. The chapter also discussed the ODL policy and that ODL institutions are governed by the ODL policy that ensures that all students in Namibia have access to ODL programmes and opportunities for lifelong learning. The ICT policy in relation to the ODL institutions was discussed which revealed that although the ICT policy in Namibia is in place, but it has not yet been implemented in most parts of the country.

The next chapter will discuss the methodology of the empirical research.

CHAPTER 3

RESEARCH DESIGN AND METHODS

3.1 Introduction

Chapter 2 discussed the literature and the theoretical framework pertaining to the use of mobile devices to improve teaching and learning in higher and distance education. This chapter deals with the research design and methodology used in the study to collect data on the use of mobile devices to improve teaching and learning in higher and distance education. The methodological approach discussed in this chapter was underpinned by the theoretical framework alluded in Chapter 2, section 2.4.

This chapter begins with the discussion of the research design containing the paradigm, and then continues to the research approach and the research sample, data collection methods and analysis of the collected data. This chapter discusses trustworthiness and ends with reliability and validity of the research findings, as well as the ethical considerations that surrounded the research prior to the conclusion.

3.2 Rationale for empirical research

The data for this study was collected by means of empirical research. Empirical research is important to increase human knowledge in a specific field. This study aims to determine how mobile devices are currently being used in the two ODL public institutions in Namibia for teaching and learning, as well as to determine the advantages and disadvantages mLearning in ODL higher education institutions.

ODL institutions can use the outcome of the study, by comparing the findings, recommendations, and see whether they can apply it to their situations. Since the researcher has realised the lack of literature on the use of mobile devices for teaching and learning in ODL institutions in Namibia, compared to the available literature on the use of mobile devices in schools and higher education. This study will contribute to a more Afrocentric body of knowledge, which is grounded in developing societies and their unique needs.

3.3 The research design

A research design is a framework of research methods and techniques that are suitable for a specific subject matter as chosen by the researcher (QuestionPro, 2021). Similarly, Trochim (2006) describes research design as the structure of the research; regarded as the “glue” that holds all the important elements in a research project together. It deals with a logic and not a problem of logistical problem (Trochim, 2006). From the above definitions, we can conclude that research design is a research plan to find answers to the research questions, by using methods on how to obtain the answers to the research questions and how the results will be treated and reported. The research design for this study is explained next, starting with the paradigm and followed by the approach followed in this research.

3.3.1 Research paradigm

According to Kivunja and Kuyini (2017) the research paradigm is, “it is the conceptual lens through which the researcher examines the methodological aspects of their research project to determine the research methods that will be used and how the data will be analysed” (Kivunja & Kuyini, 2017). Patton (2014: 91) states that a research paradigm is a set of commonly held beliefs and assumptions within a research community about ontological, epistemological, and axiology concerns. According to Patton (2014: 91) ontology refers to the nature of social reality - that is, what do we believe about the nature of reality? The epistemological assumption refers to ways of knowing – how do we know, what we know and the axiology is the ethics and value systems that is what do we believe is true. Kawulich (2012) asserts that paradigm paves the way for researchers to ask specific questions and use appropriate approaches and methods to systematic inquiry (known as methodology – that is, how should we study the world?). Hence, methodology becomes another important aspect. It is the formula to be used in finding answers to all questions people ask about reality.

There are different research paradigms. Denzin and Lincoln (2017b:97) states four research paradigms, namely: positivist/post positivist, constructivist/interpretative,

transformative/ emancipatory and postcolonial or indigenous research paradigms. The positivist research paradigm puts emphasis on the empirical approach that knowledge is based directly on experience, facts and the observable causes of behaviour in a social environment (Taylor & Medina, 2013). According to Taylor and Medina (2013) positivists make use of scientific methods and objects that have existence and meanings independent of human thinking. Post-positivists hold the same view that knowledge is discovered through the use of scientific methods and that objects have existence and meanings independent of human thinking (Dudovskiy, 2018). The interpretivist paradigm believes that reality is in the minds of people and is constructed through social interactions (Dudovskiy, 2018; Mertens, 2015).

The transformative/emancipatory research paradigm is seen as a social construct that conducts systematic inquiry that support people obtaining knowledge that can be of benefit to disadvantaged people (Mertens 2009:3). The transformative or emancipatory research paradigm embraces critical social science research, participatory action research and feminist designs, and whose research aims were to emancipate, was developed (Mertler 2005:15; Neuman 2014:8-118; Shannon-Baker 2016:323). The postcolonial indigenous research relates to the transformative paradigm (Chilisa, 2005:562). According to Kuokkanen (2000), this paradigm seeks to decolonise indigenous minds by solidifying indigenous values and cultural practices and placing indigenous peoples and their issues into dominant, mainstream discourses.

This study will use the constructivist/interpretivist paradigm. Interpretivism is the most appropriate research paradigm for this study as it underlies research studies whose aim is to understand and describe human nature (Lincoln, Lynham & Guba, 2011). In the field of education, positivist and interpretivist paradigms are commonly use (Lincoln, et. al., 2011). The objective of this study and the research question determined the type of a paradigm to be followed as well as the researcher's perceived reality of the truth (ontology) (Rehman & Alharthi, 2016). This study is of a social science nature as it deals with human behaviour of participants in their natural settings, thus exploring the use of mobile devices to improve teaching and learning in ODL institutions in Namibia.

The interpretivist paradigm believes that reality is in the minds of people and is constructed through social interactions (Rehman & Alharthi, 2016). The core principles of interpretivists are anti-positivist in principle as they are sceptical about sociology's scientific status. Interpretivists reject the view that human behaviour is predictable in the same way the natural world is seen to be. The interpretivist paradigm is thus biased in nature, yet flexible and caring about accommodating personal views (Bhattacharjee, 2012). Interpretivist epistemological assumptions are that reality is created through interactions between the participants and the researcher and is based on interpretation, better understanding, and creation of meaning, perceptions and experiences of the phenomenon (Pham, 2018). The use of the interpretivist paradigm for this study allowed the researcher to interact with the different lectures and student, collect their views in their own environment, and interpret their expressions. The researcher's aim is to determine the use of mobile devices for teaching and learning at the ODL institutions in Namibia by seeking for the views, opinions and perceptions of lecturers and students, because the use of mobile devices can't be directly observed and counted.

The types of beliefs held by individual researchers as paradigms often lead to embracing a qualitative, quantitative, or mixed-methods research approach in carrying out their research (Creswell 2009, p. 24). The following section will explain the research approach applicable to this study.

3.3.2 Research approach

A research paradigm, as discussed earlier, is regarded as an integrated body of substantive concepts, variables and problems with corresponding methodological approaches and tools guiding the initiative of finding answers to a research problem (Rehman & Alharthi, 2016). As a result, certain research paradigms are associated with certain research approaches and methods. Research approaches refer to the plans and procedures for the research and spans the steps from broad assumptions to detailed methods of data collection, analysis and interpretation (Creswell 2014, p. 31). This research makes use of mixed method approach. The study is an inductive research

approach, that would be more concerned with the context in which such events were taking place.

The inductive research approach is qualitative, which means that the researcher develops a theory or looks for meaning based on the data collected (Saunders, Lewis & Thornhill 2012). The approach to data collection and analysis is methodical but allows for greater flexibility than in quantitative research (Saunders et al., 2012). This study also made use of quantitative research approach to analyse the questionnaire information to lecturers and students on the use of mobile devices for teaching and learning. The questionnaires used were from Google Forms as a quantitative research method in collecting data. This type of data collected are quantitative in nature and therefore made a quantitative approach visible in the carrying out this research. Google Forms collects and converts data into numerical forms and enables statistical calculations and conclusions to be drawn from the data. Google Forms analyses the results in a spreadsheet with Google Sheets and presents it in bar graphs, pie charts, etc.

This research is an exploratory study as the researcher is trying to find out “what is happening; to seek new insight; to ask questions and to assess phenomena in a new light” (Creswell & Poth, 2018). According to Yin (2018) there are different types of case studies, namely the exploratory and the descriptive case study. The exploratory case study examines a case without a clear set of outcomes (Yin, 2018). According to Creswell & Poth (2018) a case study examines a situation, activities or a group of people limited to a specific time and place. A case study research design is commonly used for social sciences that investigate a phenomenon within its real-life context (Saunders et al., 2012). Case studies are descriptive and informative about a specific situation (Creswell & Poth, 2018). Case studies can also be differentiated between single-case study and a multiple-case study. A single-case study refers to the examination of one place to develop a more in-depth understanding of phenomena, while a multiple-case study refers to research in which the researcher studies multiple cases to develop a more in-depth understanding of the phenomena (Mills et al., 2010). This research makes use of a multiple-case study research, because more than one variable case is selected to develop a more in-depth understanding of the phenomena than a single-case can provide (Mills et al., 2010). In

this case study, multiple case studies provided a basis for theory building because having multiple cases, in this case NUST: COLL and NAMCOL allows for a comparison of those cases, which led to a stronger theory. In this case, the two variables are NUST and NAMCOL, selected to develop a more in-depth understanding of the phenomenon, which is the use of mobile devices. These decisions include sampling, sources and procedures for collecting data, measurement issues and data analysis plans.

3.4 Research methods

The research methods were used to investigate the use of mobile devices in teaching and learning in ODL institutions in Namibia. The research methods used in this study describe how data was collected to achieve the aims of the study. The following aspects will be discussed: the selection of the participants and data collection.

3.4.1 Selection of participants

The ODL institutions have a great number of lecturers and students who take part in teaching and learning. This study, however, is limited to the population of the lecturers and students who use mobile devices for teaching and learning. This section discusses the institutions of the participants and the sampling procedure.

3.4.1.1 Description of research sites

This research focused on two ODL public institutions in Namibia, namely the Centre for Open and Lifelong Learning at the Namibian University of Science and Technology (COLL) and the Namibian College of Open Learning (NAMCOL). The two ODL institutions will be discussed in detail below.

3.4.1.1.1 The Namibian University of Science and Technology (NUST) - Centre for Open and Lifelong Learning (COLL)

The Centre for Open and Lifelong Learning (COLL) is a distance education centre at NUST mandated to design and deliver open and distance learning on behalf of the university. COLL serves as an extension of NUST, to provide learning opportunities through diverse programmes and methodologies (Möwes, 2005). The courses offered at COLL are mostly in print with a few fully fledged online courses. Face-to-face classes are provided on weekends and students are required to submit their assignments online.

COLL has over 160 part-time academic staff and over 8 000 ODL students. With the outbreak of the Covid-19 pandemic, COLL's transition to remote learning was that all courses were offered online using Microsoft Teams. Part-time lectures were appointed on contract basis to facilitate teaching and learning for ODL students. This research only selected the academic staff and ODL students of COLL who were involved in the use of mobile devices of teaching and learning to form part of this study.

3.4.1.1.2 The Namibian College of Open Learning (NAMCOL)

The Namibian College of Open Learning is a state-owned institution established through an Act of Parliament, Act 1, 1997 (NAMCOL, 2020). NAMCOL provides flexible distance learning opportunities for Namibian out-of-school youth by offering Grade 10 and 12 to those no longer in the conventional school system, as well as tertiary programmes in various fields of study. NAMCOL offers most of its courses in print with a few online courses. NAMCOL has over 1 500 part-time academic staff and over 28 000 ODL students (NAMCOL, 2020). NAMCOL has provided some of the tertiary students' tablets for online courses. Face-to-face tuition is provided as well as self-instruction learning materials to enable students to study on their own. Multimedia content is developed to supplement print-based materials and are released in different formats such as radio, video and online platforms. With the outbreak of the Covid-19 pandemic NAMCOL's transition to remote learning was that all courses were offered online using an eLearning platform. This research only selected part-time academic staff and ODL students who were involved in the use of mobile devices of teaching and learning to form part of this study at NAMCOL (NAMCOL, 2020).

3.4.1.2 Sampling procedure

Sampling involves decisions about whom to select, what setting, and what to observe (Cherry, 2017). In this study, the target population consists of ODL lecturers and students at the two ODL institutions in Namibia, namely COLL at NUST and NAMCOL, who are using mobile devices for teaching and learning. McMillan and Schumacher (2010, p. 129) define the concept population "as a group of elements or cases, whether individuals, objects, or events, that conform to specific criteria and to which the results of the research

are to be generalised". It is not practical to involve all members of the population due to various factors such as time, accessibility, and cost among others; therefore, a small group of the population is selected. A sample is a small group of participants selected to represent the entire research population (Cherry, 2017).

The researcher made use of purposive sampling to select the sample of distance education students and lecturers at the two ODL institutions who use mobile devices for teaching, learning and student support. McMillan and Schumacher (2006) describe purposive sampling as a technique that selects just those participants who are relevant to the study. There are seven types of purposive sampling, namely, maximum variation, homogeneous, typical case sampling, extreme case sampling, critical case sampling, total population sampling and expert sampling. For this study, homogeneous purposive sampling was used to select the participants. Homogeneous sampling is used when participants share characteristics or set of characteristics required for the study (Etikan, Musa & Alkassim, 2016). Homogeneous sampling is used when the goal of the research is to understand and describe a particular group in depth (Khalifa, 2016). In this research the researcher wants to study a phenomenon, which is the use of mobile devices for teaching and learning in ODL institutions in Namibia. The participants for this study share the same traits in terms of their job (students and lecturers), which is ODL students and lecturers, and the experience on the use of mobile devices of teaching and learning in an ODL environment. This study involved 24 participants in total, as this is a research of limited scope. That is 12 academic staff, who were interviewed, and 12 ODL students, who received a questionnaire. The participants were selected on the following bases:

- The researcher made a request to the ODL institution to provide a list of names of ODL students and lecturers with experience on the use of mobile devices of teaching, learning.
- From the list received from the institution the researcher randomly selected ODL students and lecturers. This is because random selection eliminates bias selection, and it gives each participant in the population an equal chance of selection for inclusion in a sample.

- Twelve lecturers (full-time staff or contract) from two ODL institutions, involved in teaching and learning using mobile devices were selected.
- Lecturers must have been teaching using a mobile device, such as smartphone, Apple iPhone, Apple iPad, Android, Windows tablet, Kindle, etc.
- Lecturers must have experience of at least one year using mobile device, such as smartphone, Apple iPhone, Apple iPad, Android, Windows tablet, Kindle, etc.
- Twelve ODL students from two ODL institutions, using mobile devices for learning.
- Distance student must have a compatible mobile device (smartphone, Apple iPhone, Apple iPad, Android, Windows tablet, Kindle, etc.).

The sample was used to provide data as empirical evidence to the target and study population from where it was drawn. The empirical data for this study was collected using the data collection procedures as discussed in the next section.

3.4.2 Data collection

Data collection involves the establishment of a systematic way of gathering information on the field under study for the purpose of answering the research question (Kabir, 2018, p. 202). According to Creswell (2014) there are four main methods for collecting qualitative data, namely, interviews, questionnaires, observations and document analysis. This study made use of interviews and questionnaires as methods for collecting data. The list of students and lecturers' names were provided by the ODL institutions, Student Support Officer and from the list random sampling was done.

3.4.2.1 Data collection instruments

3.4.2.1.1 Interviews

According to Yin (2013), interviews are essential sources of case study information, primarily used to gather detailed data that is difficult to obtain through questionnaires and allows the researcher to gain insight of the life experiences and views of the participants. Yin (2016) defined an interview as “a verbal interchange, often face to face, though the telephone may be used, in which an interviewer tries to elicit information, beliefs or opinion from another person”.

According to Gill, et al. (2008) there are three types of interviews, namely unstructured, structured and semi-structured. This study will make use of semi-structured individual interviews as they are commonly used to collect qualitative data. Yin (2016) state that semi-structured interviews have open questions that are specific in their intent and allow for rich data collection during the investigation.

This study conducted individual semi-structured interviews for 12 academic staff at the two ODL institutions in Namibia. The researcher made use of individual semi-structured interviews, because they are an effective method to collect qualitative, open-ended data, and to explore participant thoughts, feelings and beliefs about a particular topic. Interviews were used as they are a natural way of interacting with people and lecturers could give more insight on how they use mobile devices for teaching and learning. Each of these academic staff were interviewed online due to Covid regulations for approximately 10 minutes (See Appendix 1). To ensure that all the views that became apparent during the interviews are considered, all the interviews were recorded as per informed consent by the participants. An interview schedule for this study was a written list of open-ended questions, used to elicit the views of the academic staff in a person-to-person interaction (Kumar, 2011, p. 145). The interview questions for this study were derived from the literature review.

3.4.2.1.2 Questionnaires

A questionnaire is defined as “a written list of questions, the answers to which are recorded by the respondents” Kumar (2011, p. 145). The researcher made use of questionnaires, because data can be collected relatively quickly and the researcher would not need to be present when the questionnaires are completed. This study made use of questionnaires as they provide a relatively cheap, quick and efficient way of obtaining large amounts of information from a large sample of people. The other advantage of questionnaires to this study is that they are inexpensive, offer a quick way to get results and it is easy to analyse the result. Questionnaires consisted of open-ended questions and closed-ended questions as the study made use of a mixed-method of study. Open-ended questions allowed the participants to give free-form answers, while closed-ended

questions allowed participants to answer with “yes” or “no”, or to choose from a limited possible answer provided.

The study provided questionnaires to 12 ODL students at the two ODL institutions in Namibia. The researcher obtained the names of the students from the Student Support Officer at the ODL institutions. The students that were selected are those who used mobile devices for learning. The students that were contacted by e-mail and the researcher e-mailed the questionnaires to the students. The questionnaire was based from the literature review and consisted of 11 questions ranging from the demographic information to the perception of the use of mobile devices for teaching and learning in (See Appendix 2).

3.4.2.2 Data collection procedures

Once ethical clearance from the University of South Africa (UNISA) had been granted to conduct the research, written permission to conduct research was requested from the heads of the ODL institutions. Written permission to collect data from the students and lecturers was obtained from the Directors of COLL and NAMCOL through the Office of the Vice-Rector of the institution (See Appendices 6 and 7).

Once the ethical clearance and permissions were obtained, the researcher contacted the lecturers to schedule appointments for interviews and to confirm time slots and venues convenient to them. All participants were asked to sign a form indicating that they consented to participate voluntarily in the research. The researcher used a consent form to provide participants with written information that explain the research process that will be performed. This will enable the participants to decide whether or not to take part in the study (Shahnazarian, Hagemann, Aburto & Rose, 2017).

The researcher also contacted the students via mobile phones, and send them the questionnaires on the email. The students were asked to sign a form indicating that they consented to participate voluntarily in the research.

3.4.3 Data processing

According to Gray (2009, p. 493), data analysis is a rigorous and logical process through which the mass of collected data in a study is given order, structure and meaning. Bassey

(2002, p. 85) further stated that the aim of data analysis is to yield significant and valid answers to the research questions. This study made use of a mixed-method study, using both qualitative and quantitative data.

According to McMillan and Schumacher (2010, p. 367), qualitative data analysis is “an inductive process of examining, selecting, categorising, comparing, synthesising and interpreting data for plausible explanations to address the principal aim of the study”. For the analysis of the interview data and responses from open-ended questions, the voice recordings of the interview and open-ended responses were transcribed. The transcript data was recorded to identify and describe the patterns and themes in order to understand the meanings of these categories from the perspectives of the participants. Braun and Clarke (2006, p. 79) explain thematic analysis, which refers to themes as a method of dealing with qualitative data by identifying, analysing and reporting patterns (themes) within data. Thematic analysis consists of six phases of conducting research, namely becoming familiar with the data, searching for themes, reviewing themes, defining and naming themes, generating initial codes and producing the report (Braun & Clarke, 2006, p. 82). In this research thematic analysis allowed the researcher a lot of flexibility in interpreting the data, and to approach large data sets more easily by sorting them into broad themes. The researcher followed and updated the steps according to Friedman (2012:191) on how to analyse data from the interviews:

- a) The researcher familiarises with the data.
- b) Categorise the data into larger headings
- c) Researcher search for themes in the different interviews.
- d) Researcher organise and reviewed the themes.
- e) Connect the themes to the larger theories and produce the report.

Quantitative analysis (QA) is a technique that uses mathematical and statistical modelling, measurement, and research to understand behaviour (2010, p. 367). Collected data was analysed by Google Forms. Google Forms automatically creates charts and summarise information for the questions you asked in your Google Form.

3.5 The role of the researcher

The role of the researcher in this study is to attempt to access the thoughts and feelings of study participants. The research aim is to record the information collected and analyse the data as truthfully as possible. The researcher will refrain from reporting information that is biased (Saunders et al., 2002). To ensure that the researcher reduces bias in the reporting, the researcher verified the data collected with more data sources, checked for alternative explanations when posing questions in the interview, confirmed the accuracy of the conversation with the participants to clarify any points, and reviewed the findings with the peers (Saunders et al., 2002).

3.6 Trustworthiness

Trustworthiness pertains to the accuracy of the way the research was conducted as reflected in the correctness of the research findings (Jane & Jane, 2003, p. 273). According to Guba (1981, p. 75) there are four criteria that should be considered by qualitative researchers in pursuit of establishing trustworthiness in their qualitative, namely credibility, transferability, dependability and confirmability in qualitative research. Credibility refers to the extent of the research is believable, appropriate and truthful (Connelly, 2018). Therefore, credibility demonstrates the truth of the research study's findings with the reality. For example, in this research, the researcher contacted the Directors of the ODL institutions, to get permission to conduct the research and explain the purposes of the research. The researcher also contacted the participants (lecturers and students) to explain the ethical issues of the study and to get permission to conduct the research. The researcher investigate how lecturers and students use mobile devices in teaching and learning in ODL institutions in Namibia. Thus, the credibility of this research should reveal the truth of how mobile devices are used in the findings. The findings are discussed in the next chapter.

Next, transferability states the degree to which the results of the research can be generalised to other contexts. According to Mackey and Gass (2005:180) “although the qualitative research findings are rarely directly transferable from one context to another, the extent to which findings may be transferred depends on the similarity of the context”. Therefore, researchers can use the results of the findings and apply them to similar ODL

institutions. Thirdly, the dependability of the research refers to the consistency and reliability of the research findings and the level to which research procedures are documented, allowing people outside the research to follow, audit, and critique the research process (Moon, Brewer, Januchowski-Hartley, Adams, & Blackman, 2016). In this research, the researcher ensured that the research process is logical, traceable, and clearly documented.

Lastly, confirmability is when other researchers can confirm the findings of the research study to be true. In this research study, the researcher has made the data and interpretations available on which the findings were based, as it was based on qualitative research. This means that other researchers should be able to study the data, confirm, modify, or reject the interpretations. The researcher has also included the quotes of the participants, to give a true reflection of the views and expression of the participants. This will serve as evidence for other researchers to review. Hence, this explains that the confirmability was attained in the current study.

This research relied mainly on a qualitative research approach as supposed to quantitative research. This research ensured credibility by ensuring the honesty of participants during data collection and iterative questioning. This ensures that only willing participants were allowed to contribute and participate in the study and the researcher clarified any questions which were not clear to the participants. In order to ensure the dependability of this research, the researcher made sure that the processes within the study are reported in detail, thereby enabling a future researcher to repeat the work. Lastly, the researcher ensured that the findings of the research were the result of the experience and ideas of the participants and not the views and preference of the researcher (Tobin & Begley, 2004, p. 392) which ensures confirmability.

In the next section the reliability and validity is discussed as this measures quality in a quantitative study.

3.7 Reliability and validity

According to Ridenour and Newman (2008, p. 39) reliability is “the basic purpose of helping the researchers estimate validity of the findings”. This means validity is closely

linked to reliability and it is important for the researcher to produce valid and reliable knowledge/findings when doing the research. Cooper and Schindler (2004, p. 710) defined reliability as “a characteristic of measurement concerned with ... accuracy, precision and consistency”. The reliability in this research was visible in that the researcher gave the same instructions and the amount of time to the students to complete the questionnaire. During the interviews the researcher also gave the lecturers the same instructions and the amount of time, but the researcher could repeat the question if it was not clear. There was consistency in the results obtained from both the lecturers and the students in terms of the challenges experienced with the use of mobile devices for teaching and learning.

There are different types of validity such as criterion-related validity, predictive validity, concurrent validity and convergent validity. Terre Blanche et al. (2006, p. 146) define validity as “the degree to which a measure does what it is intended to do”. In the same way, Ridenour and Newman (2008, p. 39) define validity as “the extent to which the test or set of data or design actually measures or reflects or produces what it is supposed to measure, reflect or produce. In this research, validity was addressed through honesty (of the researcher and participants), depth and richness of data”, and lecturers and students that were approached.

3.8 Ethical measures

The norms or standards of how people are expected to behave and to differentiate between right and wrong is called ethics (Resnik, 2015). In research the researcher is required to guard against fabrication or falsifying of data and should promote the truth, thus promote which is the primary goal of research (Resnik, 2015). Ethics in research is important as it support the values required for collaborative work, such as mutual respect and fairness. It also supports important social and moral values, such as the principle of doing no harm to others. To ensure that all ethical standards in research were adhered to, the researcher followed the following steps.

A letter was written to the two heads of the ODL institutions in Namibia to request permission to do the research. Permission was obtained from the ODL institutions to

conduct research with both the lecturers and the students. The researcher was granted ethical clearance from UNISA (See Appendix 5). Applying for ethical clearance from the university is standard practice for a research study. The informed letter of consent highlighted the need to have consent of participation by the participants as well as to guarantee the anonymity of all the participants in the research study (See Appendix 3 and 4).

The researcher has access to the identities and contact details of participants, but such information remain confidential as the sole purpose of the information was for the research. The empirical data collected for research purposes was securely stored in a password-protected folder.

3.9 Conclusion

In this chapter, the researcher gave a detailed account of how the empirical research was conducted. The researcher provided an explanation for designing a mixed-methods study. The data collection instruments used in the study, namely a questionnaire and an interview schedule, were explained. A discussion on how data analysis was carried out and the role of the researcher was explained. The trustworthiness, reliability and validity of the research instruments was explained. Furthermore, the chapter discussed ethical considerations that were observed in order to protect the privacy of the participants.

The next chapter provides the analysis and interpretation of the data.

CHAPTER 4

DATA ANALYSIS, INTERPRETATION AND PRESENTATION OF FINDINGS

4.1 Introduction

The research design and the methods used for this study was discussed in Chapter 3. This chapter presents the analysis of the data collected through interviews and questionnaires in support of the research questions. The first part of this chapter describes the profiles of the participants (4.2). The second part presents the findings from interviews and questionnaires conducted with lecturers and students of the two open and distance learning institutions (4.3), namely, the Namibian University of Science and Technology, Centre of Open learning (COLL) and Namibian College of Open Learning (NAMCOL). This study collected data on how ODL students and lecturers use mobile devices to improve teaching and learning at ODL institutions.

4.2 Participant demographics

The sample for this research consisted of 24 participants (12 participants were ODL lectures and 12 were ODL students). These participants were drawn from two institutions, which form part of the research study. The study focused on two public open distance learning (ODL) institutions, namely, the Namibian University of Science and Technology Centre of Open learning (COLL) and The University of Namibia and Namibian College of Open Learning (NAMCOL). COLL is a centre within the university, while NAMCOL is a stand-alone distance education centre. The participants of the study comprised of lecturers and students who were involved in teaching and learning in these institutions at the time of the study. The study deemed it fit to collect the demographic data of the participants in addressing aspects such as gender, age and the number of years of experience with the institution. The demographic information can be useful when scrutinising the participants' views regarding the phenomenon. The participants' demographics are discussed as per institution.

Table 4.1: Summary of lecturer-participants' demographic information

Institution	Number of lecturers interviewed	Gender	
		Male	Female
NAMCOL	9 (75%)	3	6
COLL	3 (25%)	1	2

Institution	Number of student-participants	Gender	
		Male	Female
COLL	7 (58.33%)	1	6
NAMCOL	5 (41.67%)	3	2

Table 4.1 shows the summary of participants' demographic information. From the lecturers interviewed, there were four males and eight females and nine of the participants were from NAMCOL and three from COLL. The student-participants were 12, four were from COLL and eight were from NAMCOL and seven were females and five were males. The identity of the participants has not been disclosed to conform to the expectations of research ethics. Instead of identifying participants by name, pseudonyms were used.

Table 4.2: Details of lecturer-participants who were interviewed

No.	Participant	Gender	Institution	Levels of teaching	Years of experience
1.	Mr T	M	NAMCOL	Undergraduate Level	4
2.	Ms O	F	COLL	Postgraduate Level	5
3.	Ms W	F	NAMCOL	Undergraduate Level	3
4.	Mr P	M	NAMCOL	Undergraduate Level	4
5.	Ms B	F	COLL	Undergraduate Level	5
6.	Mr K	M	NAMCOL	Undergraduate Level	2
7.	Ms F	F	NAMCOL	Certificate Level	1
8.	Mr D	M	NAMCOL	Certificate Level	2
9.	Ms E	F	COLL	Postgraduate Level	6
10.	Ms L	F	NAMCOL	Certificate Level	2

11.	Ms S	F	NAMCOL	Certificate Level	1
12.	Ms M	F	NAMCOL	Certificate Level	3

Table 4.2 shows the pseudonyms used for the participants. The table also shows the gender, institution, levels of study and years of experience of the participants. Of the lecturer-participants interviewed, nine were from NAMCOL and three were from COLL. The students they taught range from certificate level to postgraduate level. The work experience ranges from one to six years. Next, we look at the details of student-participants who completed the questionnaire.

Table 4.3: Details of student-participants who complete the questionnaire

No.	Participant	Gender	Institution	Field of study	Age group
1.	Ms C1	F	COLL	Undergraduate Level	18-29 years
2.	Mr N2	M	NAMCOL	Certificate Level	18-29 years
3.	Ms C3	F	COLL	Undergraduate Level	18-29 years
4.	Mr C4	M	COLL	Undergraduate Level	18-29 years
5.	Ms C5	F	COLL	Postgraduate Level	18-29 years
6.	Ms C6	F	COLL	Postgraduate Level	18-29 years
7.	Ms C7	F	COLL	Postgraduate Level	18-29 years
8.	Mr N8	M	NAMCOL	Postgraduate Level	40-49 years
9.	Ms N9	F	NAMCOL	Postgraduate Level	18-29 years
10.	Ms N10	F	NAMCOL	Undergraduate Level	18-29 years
11.	Ms C11	F	COLL	Postgraduate Level	30-39 years
12.	Mr N12	M	NAMCOL	Certificate Level	18-29 years

Table 4.3 shows the pseudonyms used for the student-participants. The table also shows the gender, institution, field of study and age groups of the participants. Of the student-participants who completed a questionnaire, seven were from COLL and five were from NAMCOL. The students' fields of study range from certificate level to post graduate level. The age group was mostly 18-29 years with one aged 30-39 years and another 40-49 years. The demographic information can be useful when analysing the participants' views

regarding the phenomenon. Participants demographics are discussed in groups as per their institutions and are referred to as per first letter of their name for the purpose of anonymity. The discussion of the interviews and questionnaire is in the next section.

4.3 Presentation of the findings from the interviews and questionnaires

As mentioned in the previous section, this discussion is about the findings of the interviews and the questionnaires. The aim of this study was to determine the use of mobile devices for teaching and learning in ODL institutions in Namibia. The questionnaires were e-mailed to the student-participants using Google Forms and students were given a week to respond. The lecture-participants were interviewed online and notes were taken during the entire process. The analysis of the interviews and questionnaire were divided into five themes that was informed by the research questions. The research questions were subdivided into questions posted to participants in the questionnaire and interviews.

Table 4.3: Research themes

Research themes	Research questions	Questions to participants
1. Access to internet and mobile device	How are the mobile devices used in teaching and learning in ODL higher education institutions?	<ul style="list-style-type: none"> • How do you get access to the internet? • Do you communicate with your students/lecturers on your mobile device? • If yes, what application do you use to communicate with your students on your mobile device?
2. Use of mobile devices		<ul style="list-style-type: none"> • How are you incorporating mobile devices in your teaching/learning? • Which activities do you

- | | | |
|---|---|---|
| <p>3. Advantages of using mobile device for teaching and learning</p> | <p>What are the advantages and disadvantages of mobile devices in teaching and learning in ODL higher education institution?</p> | <p>incorporate in your teaching?</p> <ul style="list-style-type: none"> • Which learning activities do you mostly use on your mobile device? |
| <p>4. Disadvantages of using mobile device for teaching and learning</p> | <p></p> | <ul style="list-style-type: none"> • State the advantages of using mobile devices for teaching and learning for you. • State the disadvantages of using mobile devices for teaching and learning for you. |
| <p>5. Strategies to improve using mobile device for teaching and learning</p> | <p>What strategies can be used to improve the use of mobile devices in teaching and learning in ODL higher education institutions in Namibia?</p> | <ul style="list-style-type: none"> • How can mobile devices be effectively used to support teaching and learning in ODL? |

Table 4.3 shows the research themes that was derived from the research questions and the analysis of the interviews and questionnaire.

The next section presents the views and opinions of the participants based on the research themes.

4.3.1 Theme 1: Access to internet and mobile device

The first theme that was researched, namely the access to internet and mobile devices, strove to determine if lecturers and students have access to internet and mobile devices and what type of mobile devices they use for teaching. It was necessary to investigate this so that the researcher could determine how this theme might have influenced the research problem and subsequent research questions.

The responses of lecture-participants from the interviews and the student-participants from the questionnaire are now discussed in greater detail, separately.

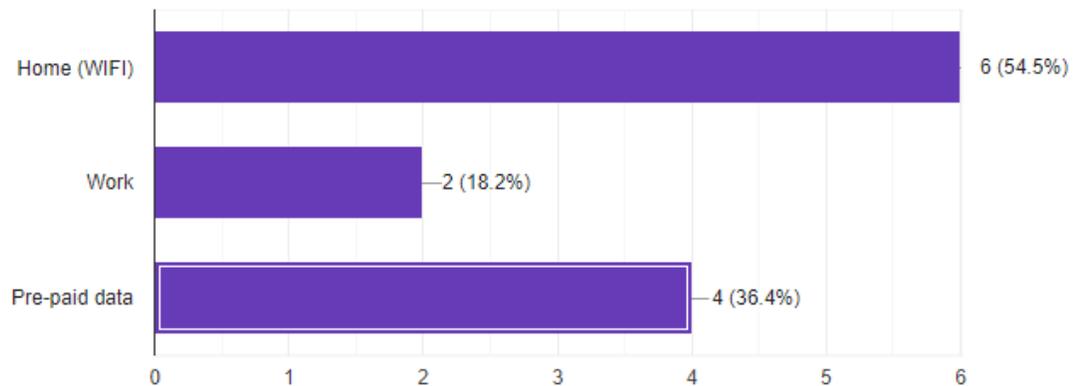
4.3.1.1 Access to the internet and mobile devices for lecturers

All 12 participants interviewed indicated that they had access to WIFI at home. At the same time four participants said that they also had access to the internet at work, while two participants indicated that they sometimes made use of prepaid data to use the internet for teaching and learning. All the lecturers also indicated that they own a laptop and smartphone, while some said they also own an iPad or tablet. Mr K indicated like all the participants that he installed WIFI at home and has a laptop and a smartphone, while Ms L confirmed that *“the WIFI at home is sometimes so slow or it gets depleted before the end of the month that I am forced to go and buy prepaid data to teach online. I also have an iPad and a laptop.* Ms B indicated that *“I sometimes stay behind at work until late in the afternoon to make use of the internet at work, because it is faster, I have a laptop and a smartphone, although I use mostly my laptop for teaching.* Ms M stated that *“I make use of the work internet because the environment is quiet and the internet is fast”* and Mr D and Ms F respectively stated that they also mostly use the work internet because all the resources are on the work computer, although they own a laptop and smartphone. Having access to internet and mobile devices allowed the lecturers to use creative ideas in structuring content in ‘chunks’ for mobile devices. Mobile phones provide the opportunity to access content with mobile Internet or Wi-Fi and it allows learning and teaching to take place in the evenings.

4.3.1.2 Access to the internet and mobile devices for students

Most of the students indicated that they have internet, either at home (WIFI), work or pre-paid data as indicated in the table below. From the twelve (12) participants only eleven (11) participants answered this question.

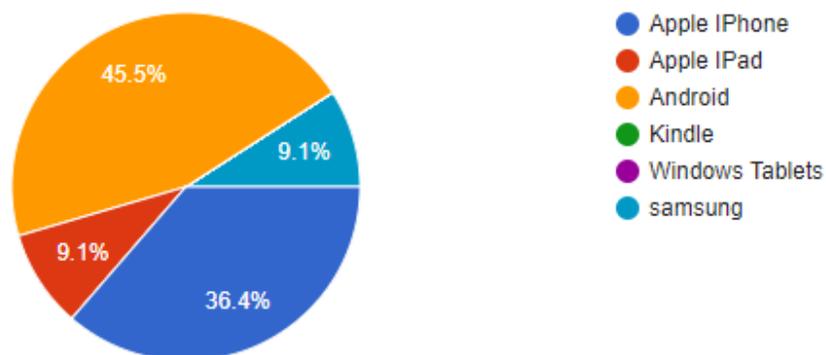
11 responses



The table above shows that 54.5% of the students have WIFI at home, while come 36,4% of students use pre-paid data and 18.2% of the students use the internet at work.

Most of the students also indicated that they mostly use their Android phones and others stated that they use their Apple iPhone for mobile learning as indicated in the table below.

11 responses



The pie chart above shows that 45.5% of the students use their Android phones for learning, with 36,4% of students that use their iPhones and the rest of the students use either Samsung or an Apple iPad. Having access to internet and mobile devices allowed the students create digital content together with their lecturers. Mobile phones provide the

opportunity for students to access content with mobile Internet or Wi-Fi and it allows learning to take place in the evenings.

4.3.2 Theme 2: Use of mobile devices for teaching and learning

The second theme, namely the use of mobile devices for teaching and learning, aimed to investigate how lecturers and students use mobile devices for teaching and learning. It was also important to ascertain how lecturers use mobile devices for assessments and what mobile application students find useful for activities/assessments.

The responses of participants regarding the questions that flowed from the research objective are now discussed in greater detail.

4.3.2.1 The use of mobile devices for teaching for lecturers

One objective of the study was to determine how lecturers use mobile devices for teaching and learning. The participants were asked if they communicate with the students on their mobile devices, and 10 participants confirmed that they did. Mr D mentions that

“I always send reminders to my students who have not participated in the discussion and assignments, especially if they do not respond on the request online. Mr K added that I have given my students my mobile number to contact if they can reach me online and then I do respond to the student on my mobile devices.”

However, two of the participants responded that they only communicated with their students on their desktop computers at work. Mr P, on the contrary, felt that his mobile device is for his private communication and thus only communicates with the students during official working hours in the office. Ms W also stated that *“I have two small children; I do not get time to respond to students on my mobile device. I only communicate with students on campus during office hours.”*

When asked which application they used to communicate with their students, the majority of the participants, namely 10, indicated that they used WhatsApp to communicate with the students, with one participant saying that he used Moodle, while

the remaining participant indicated that he/she used text messages. Mr T mentioned that *“I usually communicate on Moodle with my students at work using a desktop, but we have also created a WhatsApp group where I communicate with my students on my mobile device.”* Ms S added that they have also created a WhatsApp group for their class and on a few occasions, she makes use of an SMS to send reminders to students.

Participants were also asked how they incorporate mobile learning into their teaching. This study discovered that most lecturers used mobile devices to access the Moodle platform. All the participants indicated that they use their mobile devices to post course information and resources to students on the Learning Management System (LMS). Ms O mentioned that she uses her mobile device to access the Moodle platform at home and offer online Teams classes. She said that *“during the lockdown due to Covid-19 my mobile device was very helpful. I could teach from the comfort of my home.”* Ms L added that she uses her mobile device to upload content and additional resources to students on the LMS.

Ms E also mentioned that she also uses her mobile device to upload content-related YouTube videos for students. Ms B added that she sometimes refers students to relevant Google links for more course information.

Some more responses from the participants are listed below.

Mr T said

“because Moodle has a Moodle Mobile App available to students, I always upload my course materials to students on Moodle resources. Students can access course materials from anywhere and at any time.”

Ms O further highlighted that she also uploads content on Moodle so that students can access it on their mobile devices because of the collection of all the teaching material in one place. She further stated that she also uploads YouTube videos on Moodle and shares Google links for additional information.

The lecturers were also asked which activities they incorporate into their teaching using mobile devices. All 12 lecturers indicated that they give students assignments and activities on the discussion forums and nine of the lecturers said that they use quizzes, while six lecturers said that they used chats. Four lecturers used wikis as activities for assessments.

Some additional responses from the lecturer-participants are listed below.

Mr T said

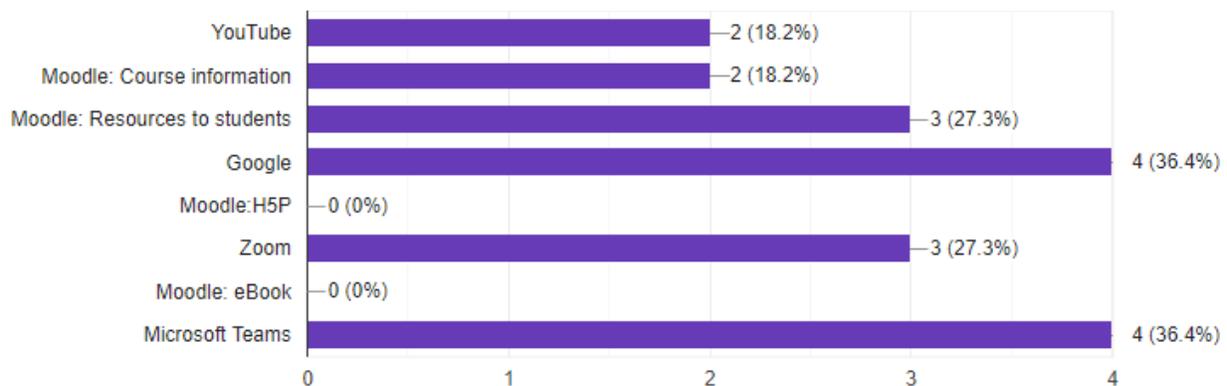
“I also use Moodle to upload the assignments and quizzes and have discussions with students.”

Ms O further highlighted that she makes use assignments, quizzes, discussions, chats and wikis as part of assessment to the students. Thus, the use of mobile devices for teaching for lecturers improve learning as mobile devices act as teaching aids, improve learning outcomes, increase engagement among students, and an easier ability to keep students up to date about assignments.

4.3.2.2 The use of mobile devices for learning for students

The students were asked which application they use most on their mobile device to learn. The top four applications indicated were Microsoft Teams, Google, ZOOM and Moodle Resources to students as indicated in the table below.

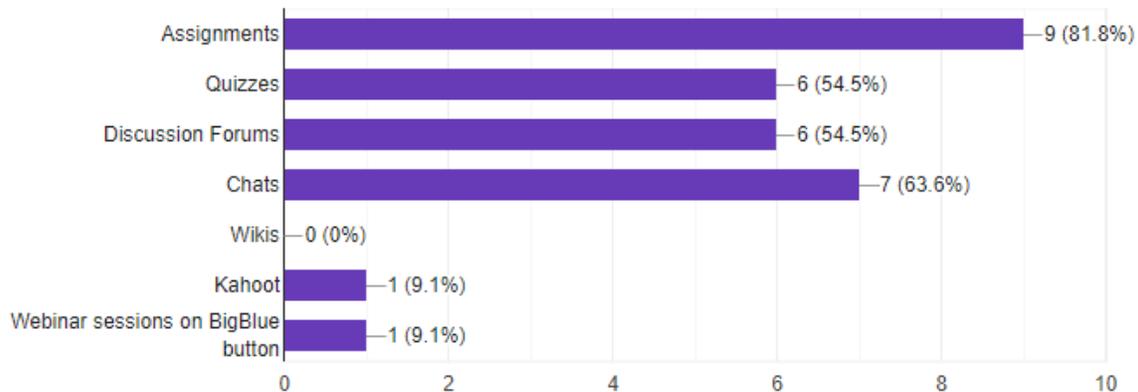
11 responses



The table above shows that Microsoft Teams and Google both have (36.4%), while ZOOM plus Moodle Resources to students received (27.3%).

The students were asked which learning activities they mostly use on your mobile device. The table below shows the results from the students' responses.

11 responses



Interestingly the students show that they also use mobile devices for assessment/activities such as assignments and discussion forums and quizzes just like the lecturers, but they have added chats as a way of activities they used on their mobile devices. The table above shows that students mostly use mobile devices for submission of assignments (81.8%) followed by chats (63.6%) and discussion forums and quizzes are third with (54.5%). The rest of the activities receive less than 10% use. The students' responses are correlating to a certain extent with a case study from an Australian Regional University from Farley, Murphy, Johnson, Carter, Lane, Midgley, Hafeez-Baig, Dekeyser and Koronios (2015) that states that students and lecturers indicated that "discussion forums were used most extensively (94%), followed by pre-recorded lectures with PowerPoint slides (90%). Activities used less frequently by lecturers included wikis (39%), instant messaging (38%), podcasts (34%) and blogs (33%)". Thus, the use of mobile devices for learning allows students to learn anywhere at any time doing course activities like assignments, chats, quizzes, discussion forums, etc.

4.3.3 Theme 3: Advantages of using mobile devices for teaching and learning

The lecturers were asked to provide a reason why they find mobile devices useful for teaching and learning. The third theme discusses the benefits lecturers and students mentioned from the use of mobile devices for teaching and learning. The benefits listed by lecturers are important to determine the usefulness of mobile devices for teaching in ODL. At the same time the benefit that students experience with the use of mobile devices will determine the usefulness of mobile devices for learning in ODL. The participants' responses regarding the advantages of using mobile devices for teaching and learning are discussed in greater detail below.

4.3.3.1 Advantages of using mobile devices for teaching for lecturers

All the lecturers found mobile devices beneficial for teaching and learning. The top five advantages of using mobile devices lecturers stated were:

- Flexible because learning is not fixed in print;
- Access the course content and learn anywhere and at any time;
- Flexible content can be presented in a form of videos and other multimedia formats;
- Easy communication between students and lecturers; and
- Course content presentation and adapted to meet students different learning styles.

Mr P felt that *for me as a lecturer, "mobile devices are flexible as I can use them at any time and it allows me to communicate with my students and staff throughout the world."*

Mr K and Mr D both mentioned that for them the biggest advantage of mobile devices is that content can be presented in different forms, for example videos, PPT), etc. This means that lecturers could ask students to watch videos or create 5 minutes, less video or audio recording of their content, rather than have students write a word essay. This is a way for students to understand the content than simply copy and paste paragraphs without necessarily understanding it. PPT are accessible way to create and present visual aids and are easy to read on the mobile devices, compared to long paragraphs of content.

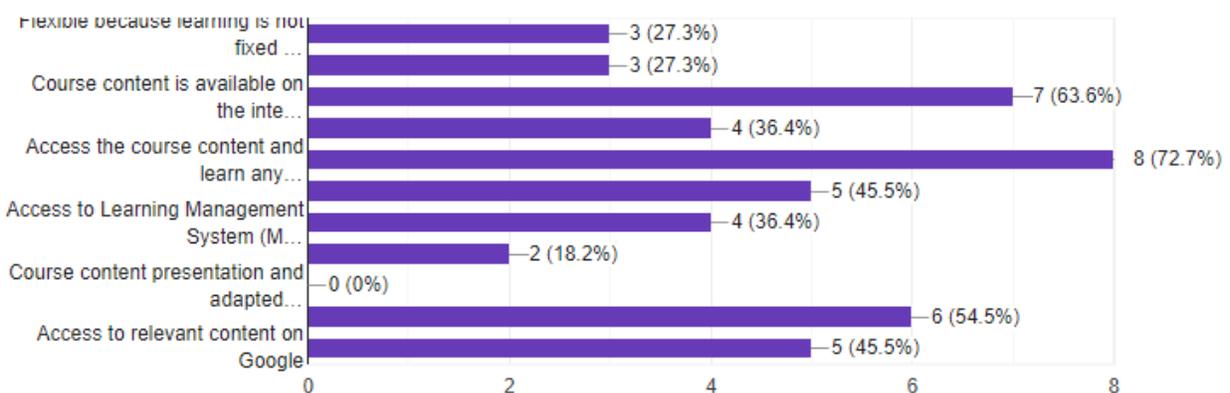
Lecturer-participant Ms E stated that “*mLearning is good for lecturers to become good educators because it will help you with new teaching strategies and styles (visual, auditory, and kinaesthetic learning styles) to suit the interests of diversified learners.*” This means that lecturers can use various ways to teach, like using micro learning, webinars, online courses, and face-to-face workshops, etc. on mobile devices. These will allow lecturers to use visual learning in which students prefer to learning through see images, graphics, colours and maps to communicate ideas and thoughts. Auditory learning means that students learn effectively through listening and kinesthetic learning style state that students learn best by manipulation or touch material.

Other responses include one of the lecturers Ms O, who said “*because the content is not fixed in print, you can use different ways to convey content, or for example, you can give students a YouTube video, discussion forums, wiki, or a Google link, to explain a difficult concept*”. The flexibility was also confirmed by Ms W who stated that “*I incorporate audio, video, text and graphics in my online courses*”. Ms O said “*my favourite advantage is that I can communicate and give class to my students at any place and any time. There is no fixed schedule which I like*”.

4.3.3.2 Advantages of using mobile devices for learning for students

All the students found mobile devices beneficial for learning. The graph below shows the responses of 11 students-participants to the benefits of mobile devices for learning. The 12th participant did not complete this section.

11 responses



According to the table above, the top five advantages of using mobile devices for students, were:

- Course content is available on the internet;
- Access the course content and learn anywhere and at any time;
- Easy communication between students and lecturers;
- Access to relevant content on Google; and
- Access to technology (mobile device).

Surprisingly, according to the graph above, some of the least rated advantages for the students were part of the top five rated advantages for the lecturers. This is because lecturers were looking at the advantage in relation to content development, while student were looking at the advantage in relation to learning. The advantages for using mobile devices for lecturers are:

- Course content presentation and adapted to meet students different learning styles;
- Mobility and size of the device;
- Flexible because learning is not fixed in print; and
- Flexible content can be presented in the form of videos and other multimedia formats.

4.3.4 Theme 4: Disadvantages of using mobile device for teaching and learning

In spite of the benefits of using mobile devices for teaching and learning, the lecturers and students listed various challenges that they experienced when using mobile devices for teaching and learning. The aim of theme four was to determine the challenges lecturers and students experienced with the use mobile devices for teaching and learning in ODL.

The responses of participants are now discussed in greater detail.

4.3.4.1 Disadvantages of using mobile devices for lecturers

The lecturers experienced similar challenges as the students in using mobile devices for teaching. Some of the views of the lecturers are listed below:

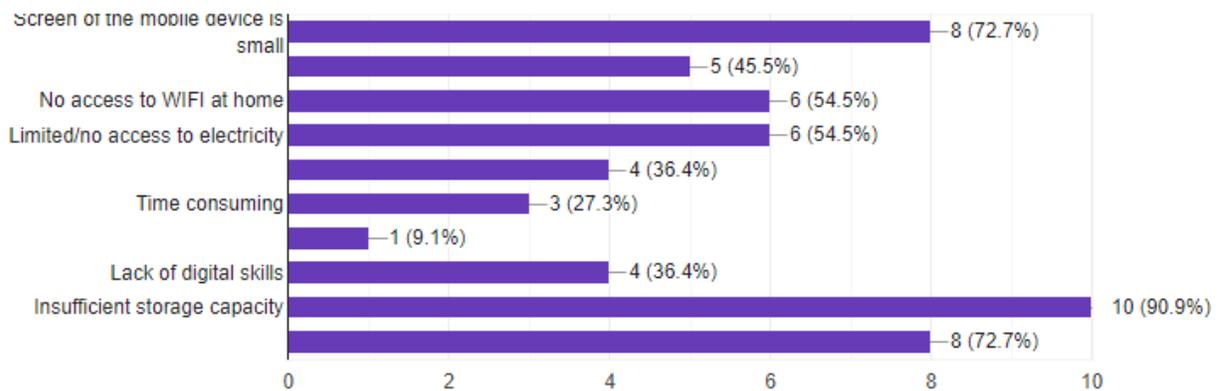
Mr P stated that the storage capacity on mobile devices was too small and students could not always open all documents sent to them. This have forced lecturers to summarise the content. At the same time, it made the opening of mobile applications slow. Ms S added that her students sometimes complained that the file/formats of content were not supported by the students' smartphones. Ms B and Ms W mentioned that the screen and key sizes made smartphones uncomfortable for learning. Mr K added that *it is difficult to get access to smartphones during constant power cuts, because without an internet bundle or WIFI connection, I cannot access the LMS online*. Ms F confirmed that she also experienced unstable internet connectivity which made it difficult for her to teach online.

Ms O stated that lack of electricity and internet was a problem for students who stay in urban and rural areas and in areas where the use of the internet and electricity is not yet prevalent. She further stated that *I realise it because students are not active online and discussion forums. Some of the students will call me requesting me to send them print copies of course materials*. These findings above are consistent with the findings of the Ministry of Education and Culture in Namibia (2020), on behalf of the government, that *“access to ICT infrastructure and capacity of lecturers and students to use e-learning is limited to predominantly urban areas”*. The Ministry further stated that ICT infrastructure depends on electricity and out of 346 schools nationally, 20% or 18% are without electricity and therefore without eLearning. The government further noted that *“public higher education institutions have basic eLearning infrastructure in place although bandwidth and student capacity to access teaching and learning might be a challenge”*. This will mean that students and lecturers without data, or WIFI at home will have challenge accessing teaching and learning materials.

4.3.4.2 Disadvantages of using mobile devices for students

The students' responses to the challenges in using mobile devices for learning are indicated in the graph below.

11 responses



The top five challenges indicated by students in using mobile devices, were:

- Insufficient storage capacity;
- Small screen on the mobile device;
- Opening of applications is sometimes slow;
- No access to WIFI at home; and
- Limited/no access to electricity.

Responses from the graph above shows that the majority of the respondents, 10 (90.9%) agreed to insufficient storage capacity. Also, 8 (72.7%) agreed that the screen of the mobile device was too small and the opening of applications is sometimes slow because of the storage capacity of the devices. Six (54.5%) agreed that they had no access to WIFI at home and limited or no access to electricity and this hinders the use of mobile devices for learning.

In totality, it can be seen from these mobile devices as a learning tool, that there are some obstructing factors influencing the promoting of teaching and learning in DE negatively. This finding is consistent with the works of Gikas and Grant (2013) where it was revealed that the small screen size of smartphones as compared to a laptop make them unfavourable for learning. In addition, the finding is congruent with the study of Sarfoah (2017) where it found disadvantaging factors such as unreliable internet connectivity, devices freezing at a critical point while studies are ongoing, and many others.

4.3.5 Theme 5: Strategies to improve the use mobile device for teaching and learning

Lastly, the fifth theme aimed to gain deeper insight into the recommendations that participants made as to how to optimise mobile devices for teaching and learning in ODL.

The responses of participants regarding the questions that flowed from the research objective are now discussed in detail.

4.3.5.1 Strategies to improve the use mobile device for teaching for lecturers

The lecturer-participants of the study made the following recommendations in order to improve the use of mobile devices for teaching and learning.

Ms O stated that I prefer that LMS mobile versions should be encouraged. Digital content design or development should be taken into consideration because students use mobile devices. Thus, content must be developed in such a way that it is user-friendly for students to access it on their mobile devices. In fact, one would flip the question to rather ask how learning design can be made to fit mobile device use, because it is the design that educators need to make it compatible with device diversity.

Mr P suggested that universities should get space on iCloud to support phones when storage capacity is full.

Ms B expressed the view of enhancing ICT knowledge for both lecturers and students. Also, enhancing the capacity of ICT infrastructure. This will improve high-speed Internet, and mobile broadband at the institutions and centres, which will make it easier for students and lecturers to interact with each other. In addition, improve teaching and learning that can lead to increase the students' performance.

Ms E stated that Namibia should also work to improve internet infrastructure and country information and communication technology. She further stated that MICT should promote local access enterprises such as community networks to increase connectivity to less advantaged communities and assist with digital literacy skills in these communities. Digital disadvantage is associated with educational, social and economic disadvantage. Thus, improving digital literacy less advantaged communities can ensure quality education as a tool in the fight to eradicate poverty.

4.3.5.2 Strategies to improve the use mobile device for learning for students

Student-participants were asked an open-ended question on how mobile devices can be effectively used to support learning. Students shared suggestions with regard to the strategies to improve the use of mobile device for learning in ODL. The following strategies were mentioned:

Students mentioned that access to the internet is fundamental to improve the quality of education in many ways. This because it allows students to access a wealth of information, knowledge and educational resources, as well as extend students range of learning. They proposed that institutions should provide WIFI or build internet café centres in rural and urban areas where students can have access to the internet. Some students added that the university must also increase their bandwidth on campus. *Lack of broadband connectivity is preventing us (students) to use the internet at some areas on campus.*

Students also proposed that universities find a way for them to store course content in the Cloud. This is because of limited storage capacity of mobile devices.

Some students added that lecturers must also make use of WhatsApp and Facebook as teaching methods as most students are using those apps. Mr N2 said

“Only a few classes have created WhatsApp groups, but other lecturers have not. I feel it is very useful. WhatsApp is a cross-platform smartphone messenger that requires internet data. In terms of its use in the educational field, WhatsApp enables students to send text messages, images, video, audio, documents, and even a location. The lecturer acts as the admin of the group and can post articles, video, audio, documents, pictures, and links related to the lesson. The lecturer gives the instruction and announcement in the group, whereas the assessment is given in every student’s private chat room.”

Another student added that the majority of students are on Facebook, thus it is an easier and much quicker way for lecturers to communicate to students. More students agreed that lecturers should make use of Facebook because it is a platform that students were already used to and were familiar with.

The student, Ms C2 noted that the university should improve its Moodle learning platform to make it more user friendly on the Moodle Mobile App. This will allow students to share learning materials, link to websites easily, participate in activities, access eLearning course content, check grades, etc. The students also stated that they prefer content to be better organised and clearly presented.

“I sometimes access my LMS via desktop PCs, due to the technological limitations of smart mobile devices. For example, I prefer to see the necessary announcements as soon as I access the application. Because sometimes you will spend an hour stream lining through it and not getting the information you are looking for. This results in your mobile data being depleted sooner than anticipated” (Ms N9).

Another student said that the inability to find information on Moodle using the mobile device in a quick and efficient way is very frustrating.

It is interesting to note the similarities in the strategies proposed by the lecturers and those proposed by the students. Similar strategies proposed are for the ODL centres to improve internet infrastructure at the institution. Another recommendation was the training of students and lecturers on how to use mobile devices for teaching and learning. Students will benefit from the training of lecturers due to improve learning outcomes, increased engagement among students and lecturers, and lecturers' ability to keep students up to date about course activities. Other suggestions include making Moodle Mobile more friendly and developing iCloud accounts for students to access their course content with ease.

4.4 Conclusion

This chapter dealt with the views and opinions of lecturers and students regarding the use of mobile devices for teaching and learning in the ODL environment. The findings were discussed within the framework of the main research question as indicated in Chapter 1, namely how can mobile devices be used to improve teaching and learning in ODL institutions in Namibia? The research question was intended to reveal how lecturers and students use mobile devices in open and distance education institutions, and what

strategies lecturers and students were proposing to improve the use of mobile devices in teaching and learning in ODL institutions.

The findings were grouped into five main themes. Firstly, the findings show how lecturers and students get access to internet and what type of mobile device they own. Secondly, lecturers and students were investigated on how they use mobile devices for teaching and learning in the ODL environment. Consequently, it became necessary to investigate the advantages and disadvantages of using mobile devices for lecturers and students in the teaching and learning in ODL. Finally, lecturers and students propose the strategies that can help improve the use of mLearning in ODL.

In the last chapter, a summary of this research study will be provided followed by conclusions and recommendations.

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The previous chapter dealt with data analysis, interpretation and presentation of findings. The themes that emerged from the interviews and questionnaire were discussed.

This chapter provides an overview of the study conducted. Firstly, the literature review will be discussed from Chapter 2, thereafter the findings of the empirical study from Chapter 4. The synthesis of the research findings will be discussed, which will compare the similarities and contradictions between the literature review and the empirical study conducted. Furthermore, a conclusion in relation to the research questions will be discussed. The study limitations will be stated and finally, the study will conclude with recommendations and suggestions for further research.

5.2 Summary of the literature review

The literature review in Chapter 2 dealt with Mobile Learning (mLearning) in higher education (see section 2.3). This section was aimed at determining how higher education institutions use mobile devices for teaching and learning. It also discussed the various mobile applications that higher education institutions and ODL institutions used to improve teaching and learning. Strategies on the effective lecturing with mobile devices were also discussed (Koper, 2005). The study discussed the benefits and challenges of using mobile devices for teaching and learning in ODL. The theoretical framework that is used in research on the use of mobile devices in teaching and learning in ODL institutions was also discussed (see section 2.4).

As discussed in section 2.3, mLearning is the delivery of education through the use of mobile devices (Bates, 2019). The mobile devices referred to include smartphones, tablets and iPads. This study focused on how distance education institutions use mobile devices for administration and for teaching and learning. Section 2.3.1 states that ODL institutions communicate with students for administration through SMS, notices, or WhatsApp group messages on their mobile devices. ODL institutions provide information

about timetable changes, assessment deadlines, feedback from tutors and other urgent administrative details (Gill, et al., 2008).

Section 2.3.2 referred to the mobile applications that students and lecturers use to improve teaching and learning in higher education institutions. First is the interactive mobile messaging application (IMMAP) that allows students to communicate in an intuitive way to the university in a similar way as using WhatsApp and Facebook Messenger (Gan & Balakrishnan, 2017B). This application is built into the university website and allows students to text message exchange with the lecturer or an administrative staff member. Then, the Blackboard Mobile Learn application was covered, which enables students to use their existing Blackboard username and password to access their subject sites, post to discussion forums, submit assignments and participate in all other activated information and communication tools by using their mobile devices (Kinash et al., 2012). Third, there was a SMS initiative that enables universities to reach out to students outside conventional communication spaces, and it helps keep students connected to the university, their peers and their tutors Lim, Fadzil and Mansor, (2011) and Viljoen et al. (2005).

Another mobile application is “Hotseat” that allows students and lecturers to collaborate using Facebook or Twitter accounts. Lecturers can adjust course content, improve the learning experience and provide real-time feedback during class (Morris & Parker, 2014). Another mobile application that was discussed, is Guixa, which allows lecturers to facilitate the explanation of difficult concepts via video and makes it an easy way to create, record and publish videos (COL, 2014). Microblogging was discussed, which is an application that is used for various purposes, such as to share links and information, reduce the feeling of loneliness, and improve classroom environment dynamics (COL, 2014). Lastly, the research has alluded that higher education institutions’ library services has to adapt to the mobile environment to remain relevant.

Section 2.3 gave a summary of effective lecturing with mobile devices (Koper, 2005). The five main aspects include firstly the learning design of learning activities organised through instructional planning and design. Secondly, the lecturers need to arrange the

processes of learning and teaching in order to maximise outcomes on learning. Thirdly, the lecturers need to design content that students can adapt and which is flexible in interacting with learning activities. Lastly, the lecturer's presence, skills, knowledge, attitudes and rapport in interacting with the students is important to achieve participatory learning from students.

Chapter 2 also gave an in-depth explanation of the benefits and challenges of using mobile devices for teaching and learning. Some of the benefits stated, are that mobile devices are flexible because content can be presented in the form of videos and other multimedia formats (Osakwe et al., 2019). Most university students have mobile devices. Teaching and learning can also take place anywhere and at any time (Bates, 2015). Students can access the Learning Management System (Moodle) on their mobile devices. Mobile devices are small and portable and students can carry them everywhere (Bates, 2015). Mobile technologies can improve the learning process by adapting course content presentation to students from different learning styles (Kinshuk, 2004). Communication between students and lecturers is instant and information is readily available (Liu & Guo, 2017). Mobile technologies bring an interactive learning environment into traditional learning and teaching activities (COL, 2014).

Except for the advantages, mobile devices for teaching and learning come with their challenges. According to Elias (2011), students are discouraged in using smartphones for learning because the screen is too small, the keypad is small to type on and sometimes the phone has small storage capacity. Another disadvantage mentioned by Elias is that smartphone functions are limited compared to laptops. Less privileged ODL students do not have smartphones, electricity and access to the internet Karipi (2018). Lectures and students do not use mobile technologies because of either lack of time, lack of ICT skills or lack of awareness. Acquiring mobile devices for teaching and learning is costly (Crescente & Lee, 2011). Lastly, some mobile devices have a slow speed (Schreurs, 2014).

5.3 Summary of the empirical study

This section outlines the research methodology used in this study. The research methodology will be discussed followed by the findings of the empirical research below.

5.3.1 Research methodology

The research method is the most important element of the study and thus the selected methods used are explained in this section. In Chapter 3, the data collection and data processing were explained in detail to answer the three research questions. In section 3.1, the research design explains the research paradigm; a mixed-methods research approach and a multiple-case study that was used as this study's empirical research approach. The selection of participants is discussed in section 3.4.1 and the data collection process, which comprised of interviews and a questionnaire was detailed in section 3.4.2. A detailed explanation of the data collection procedures was provided in section 3.4.2.

With reference to the selection of participants, 12 lecturer-participants and 12 student-participants who had used mobile devices for teaching and learning were identified and contacted. The lecturer-participants were interviewed using online semi-structured interviews and were recorded (see 3.4.2.1). The student-participants were e-mailed an online Google questionnaire form, which consisted of open-ended and closed-ended questions (see 3.4.2.1). It is necessary to interpret summarised data and thus the collected data from the questionnaire was presented on bar graph and pie charts. Thereafter the data collection procedures were discussed.

Before interviewing the lecturer-participants and the student-participants, a pilot study was conducted (see section 3.6). The interview guide was prepared in advance before sending the consent form to the lecturer-participants and the student-participants (see 3.4.2.2). Trustworthiness was covered in section 3.6 and the four criteria in pursuit of trustworthiness in their qualitative, namely credibility, transferability, dependability and confirmability were discussed. The credibility of this research was revealed in the research findings on how mobile devices was by the lecturers and students in ODL institutions in Namibia. The transferability of the results findings is visible in that the findings can be applied to similar ODL institutions. Furthermore, the dependability of the research is applied by the consistency and reliability of the research findings and how the research procedures were documented that allows for other people outside the research

to follow the research process. Lastly the confirmability was visible in that other researchers should be able to confirm or reject the interpretations of the study.

In section 3.7 reliability and validity is discussed as it measures quality in a quantitative study. Reliability of the research was visible in during the interviews were the researcher ensured that the instructions given to the lecturers were the same. This showed consistency in the results obtained. Validity of the research was addressed through existing knowledge received from the lectures and students. Lecturers were given the same set of questions and the students were given standardized questionnaire that is considered reliable and valid.

Finally, section 3.8 explained the ethical measures that were taken at the different stages in this study. Ethical clearance was obtained from UNISA, as well as from the two heads of the ODL institutions in Namibia. The researcher has also provided informed letter of consent to the participants (lecturers and students) to participate in the research. In the next section the findings derived from the empirical research will be discussed.

5.3.2 Findings based on the empirical research

This section summarises the findings of the interviews with the 12 lecture-participants and the feedback from the online questionnaire from the 12 student-participants from the two ODL institutions. The data collected was based on the research objectives of the study. There was consensus at some parts where the lecturer-participants and the student-participants had similar views on the use of mobile devices for teaching and learning in ODL, while others differed.

In Chapter 4, five main themes emerged, informed by the research questions. The findings of the interviews from the lecturers and questionnaire from the students were discussed separately under these themes. The first theme was: *access to the internet and mobile devices* (see section 4.3.1). The lecturers' responses towards the questions of access to the internet and mobile devices for teaching and learning (see section 4.3.1.1) indicated that they all had WIFI at home, internet at work and some indicated that they sometimes used prepaid data for teaching and learning. All the lecturers indicated that they own either a laptop, smartphone or tablet. The students' responses to whether they have access to the internet and mobile devices (see section 4.3.1.2) is that most

students used their Android phones for learning, while some used Apple iPhones and the rest of the students used either a Samsung or Apple iPad. Most of the students also indicated that they had internet, at home (WIFI), work or pre-paid data.

The second theme was *the use of mobile devices for teaching and learning* (see section 4.3.2). From the interviews with the lecturers, it emerged that most of the lecturers use mobile devices to communicate with the students through WhatsApp groups and very few indicated that they used Moodle message or SMS (see section 4.3.2.1). The lecturers also indicated that they access the Learning Management System (LMS)/Moodle on their mobile devices for teaching and learning, because students can access it on their devices at any time. Moreover, the lecturers indicated that they give students assignments, discussion forums, quizzes, chats and wikis as activities for assessments to students. The students' responses to whether they use mobile devices for learning) indicate that most students use mobile devices to attend classes online on Microsoft Teams and ZOOM (see section 4.3.2.1). The students also indicated that they make use of Moodle resources and Google to obtain additional resources and content for their courses. The students indicated that they use mobile devices for assessment/activities such as assignments and discussion forums, quizzes and chats.

The third theme was *advantages of using mobile device for teaching and learning* (see section 4.3.3). There were a number of advantages mentioned in this section. Among the advantages mentioned by the lecturers are (see section 4.3.3.1): mobile devices are flexible because learning is not fixed in print; students and lecturers can access the course content and learn anywhere and at any time and at the same time students and lecturers can communicate anywhere and at any time. Lecturers also felt that content can be presented in the form of videos and other multimedia formats, and content can be presented and adapted to meet students' different learning styles. From the students' perspective, the advantages of using mobile devices for learning include (see section 4.3.3.2): course content is available on the mobile device; students can access the course content and learn anywhere and at any time; and easy communication between students and lecturers. Student-participants also felt they can access relevant content on Google on their mobile phones and access to technology (mobile device).

The fourth theme was: *disadvantages of using mobile device for teaching and learning* (see section 4.3.4). There were a number of disadvantages mentioned by lecturers (see section 4.3.4.1). The most frequent disadvantages mentioned were: insufficient storage capacity, the small screen of the mobile device and opening of applications that was sometimes slow. Other disadvantages are no access to WIFI at home and limited or no access to electricity. From the students', the disadvantages of using mobile include (see section 4.3.4.2): insufficient storage capacity, screen of the mobile device is small, opening of applications is sometimes slow and no access to WIFI at home.

The fifth and last theme was *strategies to improve the use mobile device for teaching and learning* (see section 4.3.5). The lecturers offered recommendations (see section 4.3.5.1). such as that the course content should be designed for the use of mobile devices. Universities should get space on iCloud to support mobile devices when storage capacity is full. Furthermore, some lecturers suggested that enhancing ICT knowledge for both lecturers and students would benefit both lecturers and students in teaching. Universities should enhance the capacity of ICT infrastructure on campus and at the centres. The students' recommendations to improve the use of mobile device for learning in ODL were also researched (see section 4.3.5.2). They indicated that the internet should be made available to the students, either by providing WIFI or constructing internet café centres in rural and urban areas. They also recommended that the university must increase the bandwidth on campus; create iCloud accounts for students to access their courses; create WhatsApp and Facebook accounts for courses for easy access for students on their mobile phones and lastly the university should further improve the Moodle learning platform to make it more user-friendly on the Moodle Mobile App.

5.4 Synthesis of research findings

After having summarised the literature review and the data collected from the empirical study, the similarities and the contradictions that were discovered in the findings will be discussed. The apparent similarities between the literature review and the findings from the empirical study are related to the advantages and disadvantages of using mobile devices for teaching and learning in higher education. According to Bates (2015) the benefit of using mobile devices for teaching and learning is that content is available at

any time. Kinshuk (2004) also indicates that mobile devices can improve the learning process by adapting course content presentation to students from different learning styles. This is relevant to especially visual learning, since it allows course content to be presented in audio, video, and images (Jandhyala, 2017). Kanwar (2020) also stated that mobile devices make use of the latest technologies to bring an interactive learning environment into traditional learning and teaching activities, thus modernising learning. Mobile devices can serve as a support mechanism for communication purposes between students and lecturers, making information available instantly (Liu & Guo, 2017). Furthermore, literature shows that the fact that students own smartphones is an advantage. The findings of the empirical study relate to these statements by lecturer-participants and student-participants who mentioned that the advantages of using mobile devices is that course content can be presented and adapted to meet students' different learning styles, and content can be presented in the form of videos and other multimedia formats. The participants also revealed benefits such as learning is not fixed in print when using a mobile device, there is easy communication between students and lecturers, students and lecturers have access to technology, and content is accessible anywhere and at any time.

Other similarities detected are the disadvantages of using mobile devices. According to the literature review, Karipi (2018) indicate that less privileged ODL students do not have smartphones, electricity and access to the internet. In addition, some of the lecturers do not have mobile learning pedagogical skills to teach using mobile devices. The researcher has also noted that Namibian ODL institutions have a poor technological infrastructure as well as a lack of a policy framework to inform the use of mobile devices in institutions. As a result, there is an absence of guidance and usage of mobile devices for teaching and learning on the part of lecturers and students. Literature indicated that the disadvantage of mobile devices is that some of the devices have small storage capacity (Crescente & Lee, 2011). Furthermore, the screen of some of the mobile phones is very small, thereby compromising visibility and legibility of the learning content being displayed (Elias, 2011). Another disadvantage is that the speed of mobile devices is sometimes slower than that of a laptop and thus it is time consuming (Schreurs, 2014). The findings of the empirical study relate to these statements by lecturer-participants and student-participants who

mentioned that the disadvantages include insufficient storage capacity, screen of the mobile device is small, opening of application are sometimes slow, no access to WI-FI at home and limited/no access to electricity. Other comments include insufficient ICT infrastructure on campus and ODL centres and a lack of ICT skills for lecturers and students to use mobile devices.

The contradictions that were discovered in the findings relate to the use of mobile devices by the lecturer- and student-participants. According to the literature review (Kinash et al., 2012; Gan & Balakrishnan, 2017 a & b; COL, 2014; Lim et al., 2011; Viljoen, et al., 2005), the various higher education institutions used different mobile applications to support teaching and learning. Mobile applications like Blackboard Mobile Learn, interactive mobile messaging application, SMS initiative, WhatsApp, Facebook and many more are used for students to access their course content. The findings of the empirical study on the contrary indicated that lecturer-participants and student-participants mostly use mobile devices to access the LMS/Moodle and Google for additional resources. Other uses of mobile devices that the empirical study indicated, although to the minimum, is WhatsApp and YouTube. The data generated from the study, and especially the interviews, are analysed and presented below in the format of answering the research questions.

5.5 Conclusions in relation to the research questions

The aim of this study was to investigate the use of mobile devices in open and distance education institutions in Namibia. This research was supported by the following sub-questions:

- How are mobile devices used in teaching and learning in ODL higher education institutions?
- What are the advantages and disadvantages of mobile devices in teaching and learning in ODL higher education institutions?
- What strategies can be used to improve the use of mobile devices in teaching and learning in ODL higher education institutions in Namibia?

The sub-questions will be discussed next.

Sub-question 1: How are mobile devices used in teaching and learning in ODL higher education institutions?

The lecturer-participants were interviewed and it emerged that they use mobile devices to communicate with students through WhatsApp groups and some use Moodle message or SMS. The lecturers' teaching and learning of course content is done on the university Learning Management System (LMS)/Moodle. Lecturers upload assignments, discussion forums, quizzes, chats and wikis as activities for assessments to students on Moodle. The study also revealed that lecturers upload course content on Moodle resources for students to access and refer students to Google links to obtain additional resources.

The student-participants use mobile devices to attend classes online either on Microsoft Teams or ZOOM. Students also indicated to make use of mobile devices to access Moodle resources as well as Google to obtain additional resources and content for the courses. The students specified assessment/activities such as assignments and discussion forums, quizzes and chats that they also access on their mobile devices.

Sub-question 2: What are the advantages and disadvantages of mobile devices in teaching and learning in ODL higher education institutions?

Concerning the use of mobile devices, the lecturer-participants found that mobile devices are flexible because learning is not fixed in print and content can be presented in different forms like videos and other multimedia formats. The lecturers have also noted that course content can be presented in such a way to meet students different learning styles. Another benefit is that lecturers can access the course content on their mobile devices at anywhere and at any time and because mobile devices are portable students and lecturers can communicate anywhere and at any time.

Besides the advantages, the lecturers also found the use of mobile devices challenging because the capacity of some of the smartphones is small and thus they have insufficient storage to download all the course material. This results in the mobile devices being slow in downloading course content or opening mobile apps. Lecturers regarded mobile devices like smartphones' screen size too small to read content for a long time, which

hinders teaching and learning. Some lecturers complained that they always receive excuses from students that they have no access to WIFI at home and some even say they have limited or no access to electricity which hinders students to submit assignments on time or take part in discussions.

The results and findings from the study revealed significant variations regarding how the student-participants viewed the benefits of mLearning compared to the lecturer-participants. The students found the use of mobile devices beneficial because course content is available on the internet and students can learn at anywhere and at any time. Easy communication between students and lecturers was also alluded to by students. Students indicated that the other benefits of using mobile devices for learning is that they have access to relevant content on Google and the access to technology (mobile device). Surprisingly students shared the same challenges as the lecturers when using mobile devices for learning. Students experienced insufficient storage capacity when downloading course content and thus could not open some of the documents or opening of application were experienced as sometimes being slow. The screen size of the mobile device is too small to read for a long time. Some students also complained that they have no access to WIFI at home and some of them do not have limited/no access to electricity.

Sub-question 3: What strategies can be used to improve the use of mobile devices in teaching and learning in ODL higher education institutions in Namibia?

The lecturer-participants recommended that universities/ODL centres should enhance the capacity of ICT infrastructure on campus and at the centres. This will increase the bandwidth on campus which will allow students to access internet across the campus. Universities should get space on iCloud to support phones when storage capacity is full. In addition, lecturers recommended that course content should be designed/developed for the use of mobile devices. Furthermore, they recommended that universities develop training courses for lecturers and students to enhance their ICT knowledge to be able to use mobile device to the optimum.

The student-participants recommended that universities and ODL centres provide them with a WIFI dongle or alternatively construct internet café centres in rural and urban areas. This will enable students to have access to internet. The students also recommend that

universities increase the bandwidth on campus as there are areas without internet connectivity. In addition, the students recommend that the universities should create an iCloud account for students to access course, as this will reduce the storage capacity on their mobile devices. Students also recommend that lecturers should create WhatsApp and Facebook accounts for courses for easy access to students on their mobile phones. Finally, they recommend that the university should improve the Moodle learning platform to make it more user friendly on the Moodle Mobile App.

In conclusion, the main research question will now be discussed.

Main research question: How can mobile devices be used to improve teaching and learning in ODL institutions in Namibia?

What emerged from the empirical research is that lecturers and students use mobile devices as an extended tool to support teaching and learning. Mobile devices are used in multiple ways, such as administrative purposes, in where the institution and lecturers can inform the students about assessments, examination, fees, class schedule, etc., or they are used for online classes, and lastly, as a tool for mLearning. mLearning is a tool that ensures individualised and personalised learning processes for students. Mobile devices as a tool for mLearning can be used in several ways. The lecturers provide students with course notes on Moodle, and students can access them on their mobile devices. Students use mobile devices to take part in activities, such as discussion forum, quizzes. Mobile devices are used to source for additional course materials on Google, YouTube, etc. Lecturers and students alluded the benefits of mobile devices for teaching and learning, but also acknowledge the challenges of using mobile device. All the lecturers and students acknowledged that they need training to best utilise the use of mobile devices for teaching and learning.

5.6 Limitations

This study of limited scope focused on the use of mobile devices in open and distance education institutions in Namibia. Despite the manner in which this study was planned, the researcher encountered challenges, which can be regarded as limitations of the study.

The first challenge is related to the width and generalisability of the findings and results, due to the sample size of the public ODL institutions in Namibia. Namibia has four public ODL institutions, but because of time, and related challenges because of the Covid-19 pandemic, the researcher could only conduct the research in two public ODL institutions in Namibia. It is therefore pointed out that more research needs to be conducted on the use of mobile devices in the other two public ODL institutions in Namibia and other developing countries to give a width and proof of generalisability. As a larger and more diverse sampling selection would give the study a width. Finally, the lecturer-participants' availability was a challenge. At the time the data was collected they were busy with marking of assignments and this affected the time schedule of interviews. Despite the limitations, I am confident that this study has made a useful contribution in this important field of study. Furthermore, it can motivate more research on the use of mobile devices in the other two public ODL institutions in Namibia.

5.7 Recommendations

The study recommendation is based on the themes identified in Chapter 4 (see section 4.3). Based on the findings from the questionnaires, interviews and literature review, the study makes recommendations that relate to the use of mobile devices in teaching and learning in ODL institutions. These recommendations are made to the students, lecturers and ODL institutions.

5.7.1 Lecturers

The lecturer holds the key to the successful integration of mobile devices in teaching and learning in ODL institutions, because he/she controls their use and creates opportunities for students to successfully use mobile devices for their learning. The research findings have shown lecturers require assistance in this. Such assistance must come from the university providing training or workshops on the use of mobile devices, especially smartphones, for teaching and learning. Lecturers may seek training support from the Teaching and Learning Department or ICT Department at the university. Lecturers should ensure that they encourage students to access their LMS/Moodle on their mobile devices so as to get used to the platform. It should be made compulsory that lecturers use mobile devices to support teaching and learning. Lecturers should integrate the Mobile Learning

Design Framework for Lifelong Learning in their teaching. The Mobile Learning Design Framework for Lifelong Learning consists of four elements. The first element is the theories of learning, where lecturers are required to apply the behaviourism, cognitivism, constructivism and connectivism theory when teaching. For example, lecturer must provide immediate feedback to students as it is a motivator to students and it is a characteristics of behaviourism theory. The second element, generic mobile environment, encourages lecturers to look at the mobility and interface design media types of the mobile device when constructing content. The third element is the mobile learning context that encourages collaboration between students and students, students and activities, etc. Finally, the last element encourages lecturers to look at the student experience and the usability of the mobile device. The proposed Mobile Learning Design Framework for Lifelong Learning (Parsons et al., 2007) is recommended to provide engineering support for the successful design of future mobile lifelong learning systems. Therefore, it is recommended that mobile device training be enforced in all departments at the universities.

5.7.2 ODL institutions

According to NOLNet (2016) the ODL institutions' mission is to develop, support, coordinate and maximise resources to provide quality, inclusive, flexible, relevant, innovative and sustainable ODL programmes and services.

It is clear from the interviews, questionnaire and literature review that ICT innovation is a priority of the institutions. The study recommends that the ODL centres and institutions should invest in ICT infrastructure. In addition, the ODL centres and institutions should create WIFI hotspots at different places on campus and at the centres for students to download information at no data cost. ODL centres and institutions should train lecturers and students on how to use mobile devices effectively. The ODL centres and institutions should encourage the library to play a role in campus mobile initiatives. The universities/ODL centres should implement the Mobile Learning Design Framework for Lifelong Learning in the curriculum of all their courses. The framework is recommended to provide support for the successful design of the future mobile lifelong learning systems.

5.7.3 Ministry of Higher Education, Training and Innovation (MoHETI)

mLearning enables students to access resources for learning on their mobile devices (Solvberg & Rismark, 2012) using internet. This study recommends that the MoHETI through the Ministry of ICT allocate funds toward the development of ODL centres and institutions (study centres and laboratories) at tertiary level and where possible (NMICT, 2009). The proper installation of ICT infrastructure across the country, especially in remote areas will enable students to access the resources for learning on their mobile devices. MoHETI should implement affordable data as well as WIFI access for students. In addition, MoHETI should research ways of upgrading and installing sustainable ICT to boost teaching and learning at higher education institutions and ODL centres.

5.8 Suggestions for further research

This study revealed findings that add to the available body of research about the use of mobile devices in higher education institutions and ODL centres. The challenges MoHETI experienced in the use of mobile devices in higher education institutions and ODL centres are highlighted in this study. One of the challenges that emerged is the user-friendliness of the Moodle Mobile App. This study suggests further empirical research on the effect of mobile learning applications on students' academic achievement and attitudes. It is hoped that such research will include investigations on improvements to Moodle LMS on mobile devices at ODL institutions and other HEI in Namibia.

5.9 Conclusions

The purpose of the study was to determine the use of mobile device in ODL institutions in Namibia. This chapter provided an overview of this research study through the literature review and the summary of the empirical study. The synthesis of the research findings was also revealed and the study research questions formed the basis of its conclusions. In addition, the limitations of the study were indicated. Finally, the recommendations and suggestions for further research were listed.

ODL institutions in Namibia have induced the advent of technology and students are accessing their course content via mobile devices. mLearning is the use of a mobile device to teach and learn. The study determined how lecturers and students are using mobile devices for teaching and learning. The study provided guidance, not only as to

how to improve use of mobile devices, but also strategies or techniques that lecturers and ODL institutions can use to encourage the use of mobile devices at these institutions.

mLearning offers education to students anytime, anywhere. Universities can capitalise on the benefits mobile learning to support teaching and learning in ODL.

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APPENDIX 1: LECTURER'S INTERVIEW GUIDE/SCHEDULE

1. Opening

A. Introduction: My name is

B. Purpose: The purpose of this interview is to provide the researcher with information on how you utilise mobile devices in your teaching. This interview is for study purposes only and is voluntarily. However, your participation is greatly appreciated and will be useful for the researcher progress.

C. Time Line: The interview should take about 10 minutes. Are you available to respond to some questions at this time?

2. Body

A. General Information

Lecturers' response to gender, institution, levels of teaching, years of experience.

Participant	Gender	Institution	Levels of teaching	Years of experience
Response	R	R	R	R

B. Interview Questions

Lecturers' response to all questions I asked.

1. How do you get access to the Internet?
2. Do you communicate with your students on your mobile device?
3. If yes, what application do you use to communicate with your students on your mobile device?
4. How are you incorporating mobile learning into your teaching?

5. Name the activities that you incorporate in your teaching?
6. What advantages do lecturers experience when using mobile devices for teaching and learning?
7. What disadvantages do lecturers experience when using mobile devices for teaching and learning?
8. How can mobile devices be effectively used to support teaching and learning.

3. Closing

A. Summarise

B. Maintain Rapport: I appreciate the time you took for this interview.

C. Action to be taken: -

- I should have all the information I need. -
- Would it be alright to call you again if I have any more questions? -
- Thanks again

APPENDIX 2: STUDENT QUESTIONNAIRE

Mobile Learning Survey for Students (Questionnaire)

Mobile devices are changing how lecturers teach and students learn. Mobile devices are defined as any piece of portable electronic equipment such as a mobile phone tablets, e-readers, iPad, smartphones and laptop that you can use in different places (adapted from Cambridge dictionary, 2020).

The purpose of this survey is to provide the researcher with information on how you use your mobile device for your learning. This survey is for study purposes only and is voluntary. However, your participation is greatly appreciated and will be useful for the researcher's progress.

Make a cross (x) next to your response.

Tell us about yourself

1. Age group

18-29 years	30-39 years	40-49 years	50-59 years	+ 60 years
-------------	-------------	-------------	-------------	------------

2. Gender

Male	Female
------	--------

3. At which institution are you studying?

COLL	NAMCOL
------	--------

4. What field of studies are you doing?

	Certificate Level
	Undergraduate
	Post graduate Level
	Master's Level
	Other, specify _____

Mobile Device Use

1. What tablet/smartphone brand/model do you own?

	Apple iPhone
	Apple iPad
	Android
	Kindle
	Windows tablet
	None

	Other specify.....
--	--------------------

2. How to do you get access the internet?

	Home (WIFI)
	Work
	Pre-paid data

3. Can you access the Moodle LMS on your mobile device?

	Yes
	No

4. How do you communicate with your lecturer on your mobile device?

	Moodle LMS
	WhatsApp
	Facebook
	Twitter
	Teams
	Other: Specify_____

5. Which application do you use to learn on your mobile device?

	YouTube
	Moodle: Course information
	Moodle: eBook
	Microsoft Teams
	Moodle: Resources to students
	Google
	Moodle: H5P
	ZOOM
	Other: Specify_____

6. Which learning activities do you mostly use on your mobile device?

	Assignments
	Quizzes
	Discussion
	Chats
	Wikis
	Case Studies
	Kahoot
	Other: Specify_____

7. Please indicate the advantages of using mobile devices for learning.

	Flexible because learning is not fixed
	Flexible contents can be presented in a form of videos and other multimedia formats
	Course content is available on the internet
	Collaboration and interaction with other students
	Access the course content and learn anywhere and at any time
	Access to technology (mobile device)
	Access to Learning Management System (Moodle)
	Mobility and size of the device
	Course content presentation and adapted to meet students different learning styles
	Easy communication between students and lecturers
	Access to relevant content on Google
	Other: Specify _____

8. Please indicate the disadvantages of using mobile devices for learning for you.

	Screen of the mobile device is small
	Functions of mobile devices are limited
	No access to WIFI at home
	Limited/no access to electricity
	Poor technological infrastructure at the institution
	Lack of policy framework to inform the use of mobile technologies in institutions
	Time consuming
	Lack of digital skills
	Insufficient storage capacity
	Opening of application are sometimes slow
	Other: Specify _____

9. Provide strategies/recommendations on how mobile devices can be effectively used to support learning.

APPENDIX 3: CONSENT LETTER TO PARTICIPANTS (LECTURERS AND STUDENTS)



Consent Letter: Lecturer and Student

1 October 2020

"The use of mobile devices to improve teaching and learning in distance education in Namibia."

Dear Participant

This letter is an invitation to participate in a study. I, Joy Hambabi am conducting as part of my research as a MEd in Open Distance Learning student entitled "The use of mobile devices to improve teaching and learning in distance education in Namibia". My supervisor is Prof. G Van den Berg, with the following contact details: Tel 012 429 4895 and email vdberg@unisa.ac.za. Permission for the study has been given by your institution (COLL/NAMCOL) and the Ethics Committee of the College of Education, UNISA. I have purposefully identified you as a possible participant, because of your valuable experience and expertise related to my research topic.

I would like to provide you with more information about this study and what your involvement would entail if you should agree to take part. The aim of the study is to investigate the use of mobile devices in open and distance education institutions. In this interview/questionnaire, I would like to have your views and opinions on this topic. This information can be used to improve the effective use of mobile devices in ODL institutions.

Your participation in this study is voluntary. It will involve approximately 10 minutes in length online (telephonically). You may decline to answer any of the interview questions if you so wish. Furthermore, you may decide to withdraw from this study at any time without any negative consequences. All the information you provide is considered completely confidential. Your name will not appear in a publication resulting from this study and any identifying information will be omitted from the report. However, with your permission, anonymous quotation may be used.

The benefits of this study are that the ODL institutions in Namibia and other countries will take note of how mobile devices can enhance teaching and learning in ODL institutions. There are no known potential risks to the study

If you have any questions regarding this study, or would like additional information to assist you in reaching a decision about participation, please contact me at jtmhambabi@yahoo.com.

I look forward to speaking to you and thank you in advance for your participation.

Yours sincerely

Joy Hambabi



University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

APPENDIX 4: CONSENT FORM TO BE SIGNED BY PARTICIPANTS (LECTURERS AND STUDENTS)

CONSENT FORM

I have read the information presented in the information letter about the study in education. I have had the opportunity to ask any question related to this study, to receive satisfactory answers to my questions, and add any additional details I wanted. I am aware that I have the option of allowing my interview to be audio recorded to ensure an accurate recording of my responses. I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable). I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

Participant Name (Please print): _____

Participant Signature: _____

Researcher's Name: (Please print). _____

Researcher's Signature: _____

Date: _____

APPENDIX 5 –APPROVAL CERTIFICATE FOR RESEARCH: COE



UNISA COLLEGE OF EDUCATION ETHICS REVIEW COMMITTEE

Date: 2020/09/09

Ref: **2020/09/09/33225206/17/AM**

Dear Mrs JTM Hambabi

Name: Mrs JTM Hambabi

Student No.:33225206

Decision: Ethics Approval from
2020/09/09 to 2023/09/09

Researcher(s): Name: Mrs JTM Hambabi
E-mail address: jtmhambabi@yahoo.com
Telephone: +264 81 2514364

Supervisor(s): Name: Prof. G. Van den Berg
E-mail address: vdberg@unisa.ac.za
Telephone: 012 429 4895

Title of research:

The use of mobile devices to improve teaching and learning in distance education in Namibia.

Qualification: MEd Open Distance Learning

Thank you for the application for research ethics clearance by the UNISA College of Education Ethics Review Committee for the above mentioned research. Ethics approval is granted for the period 2020/09/09 to 2023/09/09.

The low risk application was reviewed by the Ethics Review Committee on 2020/09/09 in compliance with the UNISA Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher will ensure that the research project adheres to the relevant guidelines set out in the Unisa Covid-19 position statement on research ethics attached.
2. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.



University of South Africa
Pretter Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

3. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the UNISA College of Education Ethics Review Committee.
4. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
5. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing.
6. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
7. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.
8. No field work activities may continue after the expiry date **2023/09/09**. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number 2020/09/09/33225206/17/AM should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Kind regards,



Prof AT Motlhabane
CHAIRPERSON: CEDU RERC
motlhat@unisa.ac.za



Prof PM Sebate
EXECUTIVE DEAN
Sebatpm@unisa.ac.za

Approved - decision template – updated 16 Feb 2017



University of South Africa
Pretter Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

APPENDIX 6: APPROVAL CERTIFICATE FOR RESEARCH: NUST-COLL



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

13 Jackson Kaujeua Street
Private Bag 13388
Windhoek
NAMIBIA

T: +264 61 207 2118
F: +264 61 207 9118
E: registrar@nust.na
W: www.nust.na

Office of the Registrar

08 October 2020

Mrs. JTM Hambabi
Email: jtmhambabi@yahoo.com
Windhoek
NAMIBIA

Dear Mrs. Hambabi

RE: CONSENT TO CONDUCT YOUR RESEARCH WITH THE NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY STAFF AND STUDENT

The email dated 05 October 2020, has reference.

Approval is hereby granted for you to conduct the research on *"The use of mobile devices to improve teaching and learning in distance education in Namibia"* at the Namibia University of Science and Technology.

Any information gathered during the research is to be used for the purpose of the study only and must be treated as confidential. The results of the study should be shared with the University. Individual information of staff and students will not be made available, nor will biographical information of students be made available in such a way that individual students can be identified.

I wish you all the best with your research.

Yours sincerely,

**Ms. Selma Heelu
ACTING REGISTRAR**

CC:

Deputy Vice-Chancellor: Research and Innovation
Assistant Registrar



APPENDIX 7: APPROVAL CERTIFICATE FOR RESEARCH: NAMCOL



Private Bag 15008, Katutura, Windhoek
Tel: + 264-61-320 5111, Fax: + 264-61-216 987
www.namcol.edu.na

7 October 2020

Mr JTM Hambabi
Windhoek
NAMIBIA

RE: REQUEST TO CONDUCT YOUR RESEARCH AT NAMCOL

Your communique received on 7 October 2020 concerning the above subject matter is hereby acknowledged with gratitude.

I have the pleasure to inform you that your request to conduct research on: *"The use of mobile devices to improve teaching and learning in distance education in Namibia"* is considered positively.

You are requested to submit a copy of your research report to NAMCOL upon completion of your study.

I wish you all the best with your academic career.

Yours sincerely,


Dr H V Murangi
DIRECTOR



TAKING EDUCATION TO THE PEOPLE

Board of Governors:

Mr. Justin Ellis (Chairperson) | Dr. Hertha Pomuli (Deputy Chairperson) | Ms Mahanaim Nghishoofa | Mr. Hofni Ipings | Mr. Ash T. Uwanga |
Ms. Charlotte Kayler | Mr. Kennedy Urkhob | Dr. Heroldt V. Murangi - Chief Executive Officer (CEO) |
Ms Sanet Steenkamp – Executive Director | Mr. J. Eixab - Company Secretary | Mr. Conny Samaria - Staff Representative

All official correspondence must be addressed to the CEO

APPENDIX 8: LANGUAGE EDITED CERTIFICATE

18 January 2021

Yanna Smith

PO Box 87072

Eros, Windhoek

081 811 2117

yannaerasmus@gmail.com

TO WHOM IT MAY CONCERN:

This letter serves as confirmation that the Master's thesis: THE USE OF MOBILE DEVICES TO IMPROVE TEACHING AND LEARNING IN DISTANCE EDUCATION IN NAMIBIA as submitted by JOY TUJAMBEKA MEAMENO HAMBABI, has been edited and proofread.

Yanna Smith

Windhoek