

# TUTDoR

## Mobile Learning readiness assessment model in South African rural high school: A case of Limpopo province.

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Mobile Learning readiness assessment model in South African rural high school: a  
case of Limpopo province

By

**Manyadze Mmbudzeni**  
**200400959**

Tel: 072 499 8128

E-mail: orineamakhaga01@gmail.com

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**TSHWANE UNIVERSITY OF TECHNOLOGY**

**Supervisor**

**Dr. T.S. Adeyelure**

**Co-Supervisor**

**Dr. R.C. Mogase**

## DECLARATION

I Mmbudzeni Manyadze, hereby declare that the dissertation, titled 'mobile learning readiness assessment model in South African rural high school: a case of Limpopo province ' which I submitted for the MComputing (Informatics) Degree at Tshwane University of Technology, is my own unique work and has never been submitted to any university. I further declare that all references cited or utilized have been recognized and acknowledged through a comprehensive list of references.

Signed: .....

Mmbudzeni Manyadze

Student

Date: 16/10/2023 .....

Signed: .....

Dr ST Adeyelure

Supervisor

Date: 16/10/2023 .....

Signed: .....

Dr R.C Mogase

Co-Supervisor

Date: 16/10/2023 .....

## DEDICATION

This Dissertation is dedicated to my loving Parents, Mrs Mudanalwo Gloria Manyadze and the Late Mr Robert Manyadze, whose faith in me and encouraging words motivated me throughout my study; my grandmother vho -Tshavhungwa Mpeiwa, my Mother in Love, Mmbangiseni Betty Makhaga, my husband Bennie, who showed unwavering support and understanding during my sleepless nights, and to my children, Akonaho, Oana and Uapfa, who anticipated and believed in me. My siblings Tshifhiwa, Khuliso, Humbelani and Pfariso. The completion of this study would not have been possible without their assistance.

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## ABSTRACT

Mobile learning has become an essential component of online teaching due to the rapid growth of mobile technologies. It is regarded as potentially major learning aid since it has made learning possible at any time and from any location through the use of wireless and mobile devices. However, teachers' readiness should be considered before building and implementing a new learning system. Despite its obvious benefits, mobile learning remains mostly relatively limited and not researched in South African high schools of Limpopo department of basic education, especially in the rural areas. Therefore, the goal of this quantitative study is to assess the level of readiness of South African high schools of Limpopo department of basic education. A questionnaire was distributed to six randomly selected schools for this purpose and a sample of 250 participants was used. The questionnaire was created to investigate teachers of mobile learning. The findings revealed that the majority of teachers in high schools of Limpopo are ready for the implementation of mobile learning. This research finding has aided the department of Limpopo basic education and teachers with useful information for discovering new approaches to use mobile learning in teaching and learning.

Key words: Mobile Learning, Readiness, and Technology devices.

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## **LIST OF ACRONYMS**

ICT	Information communication technology
TAM	Technology Acceptance Model
TRI	Technology Readiness Index
SPSS	Statistical Package for Social Science

# CHAPTER 1: INTRODUCTION

This chapter provides an overview of the study's introduction and background. The chapter subsequently articulates the research problem, objectives, and research questions. Furthermore, the study's justification and the contribution made by this research are discussed. This chapter concludes by outlining the study's structure.

## 1.1. Introduction to the field of study

Education sector worldwide is currently suffering a challenge that requires the attention of every country. The use of Information and communication technology (ICT) has proved to significantly provide systems and tools that are necessary for the improvement of teaching and learning. The use of ICT tools enables solutions that benefit Schools, teachers and learners. The utilisation of ICT enables the establishment of mobile education services and is perceived as a medium for transforming educational circumstances in developing countries, particularly for teachers in remote and rural environments.

The world we live in today is driven by technology with many individuals having access to technology tools, mobile devices continuously evolving, and digital technologies being integrated into the everyday lives of numerous teachers. Learners born after 1980 are regarded as digital natives; they have grown up with digital technologies such as digital music players, computer games, video cameras, and smart mobile phones. Teachers in rural areas have yet to integrated the use of mobile devices in learning. The lack of network and computer literacy competencies makes it difficult to develop the needed mobile learning environment. Implementing a mobile environment for learning involves both teachers and learners to rethink advanced methods of learning.

Apart from lack of infrastructures and shortage of educators, schools in rural areas also experience the shortage of learning materials. Inaccessible learning information adversely affects the quality and cost of education. The researcher asserted that, the use of mobile learning tools such as laptops, mobile phones have been proved to reduce educational errors and costs. Therefore there is a great need to enhance the education systems in developing countries using

mobile learning technologies. This is especially important in the African countries that experience countless challenges in relation to pandemics particularly the Covid-19, Ebola, and HIV/AIDS (Toquero, 2020; Camilleri and Camilleri, 2022).

Mobile learning plays a significant role in addressing challenges including the lack of learning material and shortage of textbooks in rural area schools. By using mobile learning systems, education productivity can be enhanced, and accessibility of learning material can be improved. As reported in Kays and Gamundani (2020) department of Basic Education requires huge investment in ICT, and failure to successfully implement may possibly result in excessive loss with regard to money, effort and time. Therefore, implementation of mobile learning systems needs the consideration of factors that may obstruct its success. These factors include, but are not limited to, infrastructure, technical and organizational influences that compose the factors of readiness. It is, therefore, significant to take note that failure risk of a mobile learning system might be lowered by the assessment of mobile learning readiness in Limpopo rural high schools.

Soffer and Yaron (2017) recommended that educational institutions that need to implement mobile learning be prepared to accept the changes that mobile learning innovation entails. As a result, acceptance, implementation, and usage of technological innovations inside organizations need adequate change management and planning, and organizations must assess their readiness for technological advancements. As a result, it is crucial to assess mobile learning readiness prior to adoption, particularly in poor rural school districts.

Toquero (2020) observed that the adoption and use of mobile technology to support the learning process in African countries is highly ranked globally. Mobile devices are owned and used by almost everyone, regardless of age, gender, or nationality and they contain computer-like functions. Because of their functionality, portability, and convenience of use, users may easily access information, interact electronically, and carry out various personal and even work-related duties while moving from one location to another. Mobile devices are altering the way we work, live, and play.

Several teachers are attracted to mobile devices because of their simplicity of use. Because a significant large number of teachers are familiar to and skilled in using digital technology, they choose to utilize smartphones and tablets for learning purposes. As a result, there is a shift in

learning patterns. Kaliisa et al. (2019) recommend that the education system should change to facilitate mobile learning and that teachers must keep up with the shift so that they can take advantage of the move to deliver education through technology. Furthermore, teachers have been proved to prefer utilizing multimedia to engage learners in the classroom environment, such as podcasts, videos, and micro learning on the move.

The advantages of mobile learning have been stated from a variety of benefits, including but not limited to, cost savings, location-based services, ubiquitous communications and study aids. For example South African government and department of education are advising schools to shift from paper-based to digital study materials. This manifest in the environment of higher education where teachers are being encouraged to acquire study material through the accessible online services (Naicker and Van der Merwe, 2019).

Christensen and knezek (2018) stated that teachers benefit from mobile learning as they are not restricted to learning in one location or at one time and may use cellphones, podcasts, videos, and a variety of multimedia tools. Other benefits include support for collaborative learning, increased active engagement by teachers, higher completion and retention rates, support for multiple devices, and a clear learning path in which teachers receive ongoing updates and notifications about the subjects they are teaching (Ortiz and Green, 2019). In contrast, due to infrastructure restrictions, there is a strong demand for higher education in Limpopo, and schools cannot accommodate all teachers.

According to Bakhsh et al. (2020) there is great need for research that focuses on the assessment of teachers' readiness towards mobile learning technologies. Okai-Ugbaje et al. (2020) is certain that it is necessary to assess the readiness of the usage of mobile technologies for learning purposes. Therefore, the goal or the scope of this research was to develop a model that can be used to inform teachers' mobile learning readiness in South African high schools. The study also discovers the factors that affect teachers' readiness in using mobile devices for teaching and learning purposes. For data gathering, the study used the Limpopo Department of basic education. Six (6) high schools were chosen to participate in the study. Closed-ended questionnaires were used to collect data. The findings of the questionnaires and the literature were utilized to derive readiness, and then be used to develop the study's conceptual framework.

## 1.2. Background of the study

Traditionally, teaching and learning require teachers to master specific identified content. Teachers' role was to transfer their knowledge to the learners, and textbooks were perceived as the decisive significant source of knowledge. On the contrary, teaching and learning through the past years, have not been dependent on mastering the content as such, but relatively on generating new knowledge which is a constructivist approach (Macgilchrist et al., 2020). Teachers' role is to assist learners in producing new knowledge and to facilitate learning. They form merely one spectrum of the sources of knowledge. Abuloum et al. (2019) specified that the absolute quantity of knowledge and information conveyed by radio, press magazines, TV, and internet accessed through mobile devices far surpasses the measure of information conveyed by text and school instruction. As a result, contemporary educational paradigms (Mobile learning) do not focus only on knowledge production, but focus on the actual integration, application and utilization of the existing knowledge and information.

The role of interaction and communication in the learning process turns out to be a critical success factor. It is in this context that mobile learning should contribute to the quality of learning because of the interaction environment and the rich communication it provides. The classical difference between contact and distance learning is decreasing as distance and contact education approaches are being integrated. Pensabe-Rodriguez et al. (2020) mentioned that mobile learning should prove to be a useful tool for integrated training that utilizes remote and face-to-face methods.

Current mobile devices are more advanced than desktop computers from the 1990s, and the paradigm has shifted. The world has transitioned from using stationary computers to portable mobile devices (Sullivan et al., 2019). Mobile devices are widely utilized to exchange knowledge in both urban and rural areas. They are utilized in both informal and formal transfer of information. It is also recognized by Soffer and Yaron (2017) that mobile learning is capable of highly contributing to formal learning benefits. Teachers in the twenty-first century must adapt to new learning methods because they are expected to be critical thinkers with the abilities needed to solve problems collaboratively and communicate using various technologies. As a result, they are considered as "born after technology" (Leem and Sung, 2018).



Mobile learning assists teachers with a unique and an exciting opportunity of gaining instant access to teaching and learning material regardless of their location (Ngesi et al., 2018a). It has the potential to reach inaccessible areas where there are no learning facilities, and to enable teachers to access subject contents, tests, assignments and previous examination papers through devices they use for other purposes in their daily life. However, (Chaka and Govender, 2017) strongly recommended that there is a need to assess readiness of users before deploying mobile learning approach in the schools.

Kaliisa and Picard (2017) are of the view that there are documented technological issues regarding the deployment of teaching technologies in the department of education and amongst them are small keyboard, low resolution, generalized compatibility and small memory space. Regardless of countless advantages of mobile learning as a technology to improve teaching and learning in all education institutions, there are some issues that need to be reflected as concerns facing its implementation. According to previous researches, the issues of mobile learning are that users' psychological issues have been pointed out by (Terras and ramsay, 2019); (Sattarov and khaitova, 2020); and (Creswell and Creswell, 2017). Teachers are likely not using technology for teaching and learning purposes rather they use mobile technologies more for social media relations, entertainment, watching videos and listening to music ((Jantjies and Joy, 2015); and (Ngesi et al., 2018b).

The implementation and integration of mobile learning technologies in education face major technical issues. Some of these issues are described by Abd samad et al. (2021) as "installation, availability of newest technology, fast internet connection, and uninterrupted supply of electricity, maintenance, administration, security, and lack of technical assistance." Therefore, a readiness assessment model for mobile learning was developed for South African rural high schools in Limpopo province.

### **1.3. Research Problem**

Access to quality learning material is a huge challenge in South African high schools particularly in Limpopo province (du Plessis and Mestry, 2019). Shortage and late delivery of textbooks seems to be a yearly occurrence since the 2012 textbooks crisis. Several teachers could have no teaching and learning materials due to the shortage and late delivery which resulted in high rate

of failure (Musitha and Mafukata, 2018). As a result of this, the quality of the teaching and learning process within the rural high schools has dropped considerably.

School learning has always been understood as requiring the learners to be present in the classroom at the appropriate time and with the designated teachers. Some students may not be able to study well due to time constraints (Ngesi et al., 2018a). Schools in a rural remote area of Limpopo province are facing challenges of time constraints and limited resources.

The advancement of information technology (IT) has brought us to the digital world we live in today, where mobile phones are the preferred technological devices among South African teachers. Mobile devices have significant software and applications built-in; among which are the WhatsApp messenger, Facebook messenger and SMS. These have become the preferred means of communication for youth all over South Africa and are also used by teachers since the majority of them use mobile devices such as tablets and smartphones (Ngesi et al., 2018a). Globally, the use of mobile devices has increased significantly. However, according to du Plessis and Mestry (2019), the evolution of utilization of mobile devices in higher education for learning is uncertain when compared to communication and social networking.

Mobile devices have been utilized widely across the world for teaching and learning. South African teachers' readiness for mobile learning has been investigated by several scholars Keengwe and Bhargava (2014); and Kaliisa and Picard (2017). However, Ngesi et al. (2018a) state that mobile learning is still emerging and there is a gap in the assessment of teachers' readiness. There are countless issues facing readiness towards deploying mobile learning platforms such as the connectivity technical limitations, small sized screen, slow network speeds and inadequate memory (Chaka and Govender, 2017); (Chavoshi and Hamidi, 2018); and (Suhail, 2017). Musitha and Mafukata (2018) further stated that assessing the readiness towards the deployment and adoption mobile learning, even with the overwhelming benefits it comes with, is crucial towards within the educational environment.

Based on the reviewed literature, this study identified the lack of a model for mobile learning readiness assessment that would ensure effective deployment of mobile learning required to improve the education system in the rural South African high schools, which informed the study's goal.

## **1.4. Research Objectives**

To address the identified problem, the following goals and objectives were established in this study:

### **1.4.1. Goal**

To develop a mobile learning readiness assessment model in South African rural high school: a case of Limpopo province.

### **1.4.2. Specific objectives**

The specific research objectives are:

- I. To identify the factors that influence the mobile learning readiness.
- II. To determine the influence of the identified factors to the mobile learning readiness in South African rural high schools.

## **1.5. Research Questions**

### **1.5.1. Primary Research question**

The main primary question for this research is:

What Model will inform mobile learning readiness in South African rural schools?

### **1.5.2. Secondary questions**

The researcher used the secondary research questions listed below to address the previously specified question:

- I. What factors will influence teachers' mobile learning readiness?
- II. What is the influence of the identified factors on mobile learning readiness in South African rural high school?

## **1.6. Justification of the study**

Mobile learning is providing an enhanced ICT-dependent environment in which data is readily available and accessible, shared, and utilized at any time and from any location. However, irrespective of their potential to enhance teaching and learning, the mobile devices for learning are still outlawed and disliked in South African rural schools (Ngesi et al., 2018a). This is because of the perception that the devices will be misused by teachers and be disruptive in the classroom. This, however, does not mean that teachers and learners do not bring mobile phones into classrooms. O'Bannon et al. (2017) mentioned that people of all ages, especially youth of school going age, are addicted to using mobile phones to a point where, even when there are rules set to prevent them from bringing mobile devices to the classroom, they still find their way to do so. This clears the teachers' perceptions towards the potential of using mobile devices to improve learning in a rural high school.

There might be rules of not bringing mobile devices to classrooms in South African schools. However, the Gauteng Department of Basic Education has provided secondary schools with tablet computers and this is said to have improved teachers' and learners involvement and engagement in classroom learning (O'Bannon et al., 2017).

Teachers play a significant role in learning activities. They are moreover the key players in shaping mobile learning integration. However, Ngesi et al. (2018a) noted that these roles could only be effective if teachers are ready to use mobile devices for teaching and learning purposes. Prior to implementing mobile learning, it is critical to assess teachers' mobile learning readiness (Suhail, 2017). Addressing the factors that affect teachers' mobile learning readiness is important in order to increase their abilities and make mobile learning effective.

Therefore, this study is important because it adds to the current debate on the teachers' readiness towards the incorporation of mobile learning in teaching and learning in a rural high schools' system of education.

## **1.7. Expected Contribution**

This research provided three contributions: methodological, practical, and theoretical.

### **1.7.1. Methodological Contribution**

The results of this research are based on data obtained from completed questionnaires among teachers in South African rural high schools. Data were thoroughly analyzed in order to determine the model that will be developed to address the identified factors. The study was to probe, understand and clearly articulate the factors influencing the teachers' readiness in mobile learning. Therefore, this study contributes to existing body of knowledge.

### **1.7.2. Practical Contribution**

The study was conducted to find more about teachers' perceptions and readiness for the use of personal technology for educational purposes. Teachers often bring mobile devices to school and utilize them during lessons. Therefore, the goal of this research was to evaluate how ready teachers are for mobile learning in rural South African schools in the province of Limpopo. By analysing teachers' individual, organizational, and social readiness for the adoption of mobile learning, the study used TAM and TRI to develop a model that will assess teachers' readiness for mobile learning.

The research model that was developed assessed the link between the TAM factors of perceived usefulness (PU) and perceived ease of use (PEU) and the psychological factors of the TRI model (optimism, innovation, discomforts, and insecurity). A conceptual framework that has been developed might be used to advise authorities on how ready teachers are for mobile learning. This research contributes to the body of information presently available on mobile learning.

### **1.7.3. Theoretical Contribution**

This study aimed to develop a model that will assess teachers' mobile learning readiness in high school, especially those in the rural areas. The proposed model will help Limpopo department of basic education to understand the factors that significantly influence the teachers' readiness in mobile learning, mainly within the rural area of Vhembe district in Limpopo. Future researchers will use this study as a foundation of understanding factors that influence the teachers' readiness in mobile learning.

## **1.8. Limitations**

The scope of this research was to assess the teachers' readiness to adopt mobile learning in high school, especially those in the rural area high schools. This research was conducted in rural schools of Vhembe district in Limpopo; because teachers in these schools are disadvantaged. The objective of this research was to assess the teachers' mobile learning readiness. Questionnaires were sent to teachers in the selected schools. Participant honesty in answering questions determined how accurate the data gathered from them is. The development of a mobile learning readiness model and studies on teachers' readiness for mobile learning have only been done by a small number of scholars.

### **1.9. Outline of the Dissertation**

**Chapter 1:** Introduction - This chapter serves as an introduction to the research study by presenting the historical context that leads towards the formation of the research topic.

**Chapter 2:** Literature Review - This chapter presents the literature related to teachers' mobile learning readiness. The chapter reviews the existing literature in the area of mobile learning readiness.

**Chapter 3:** Research methodology and design - This chapter discuss the theoretical frameworks that were used in the study and conceptualize the factors that were used to formulate a conceptual framework for the study. This chapter discusses the methodological approach that was followed in this study. It discusses how data were collected and the reason why a specific method was selected.

**Chapter 4:** Analysis and Findings – This chapter presents the analysed data. This chapter presents a summary of the data analysis and findings.

**Chapter 5:** Discussion, Interpretation of findings and conclusion - This chapter presents an outline of the study, a discussion and analysis of the findings, conclusion, and recommendations. The chapter also summarizes the findings of the study by answering the research questions.

## **CHAPTER 2: LITERATURE REVIEW**

This chapter reviews and discusses the literature in the area of mobile learning readiness in High schools. The chapter starts by discussing the mobile learning, mobile learning tools and the significance of using mobile learning in South African Limpopo high schools, mobile learning readiness, mobile learning on Basic Education, related work, related IS theoretical framework advantages and challenges of utilizing mobile learning in South African High schools of Limpopo province. The chapter also presents the research models and concludes with the development of hypotheses and the chapter summary.

### **2.1. Mobile Learning**

New teaching and learning methods have emerged as a result of the present global transformation, which has also increased access to educational materials that go beyond what has previously been offered. Numerous schools around the globe, including those in South Africa, are using the infrastructure of IT to raise the quality of instruction. The use of mobile learning in schools will open up new chances for instructors and students to participate in novel information-gathering activities (Bernacki et al., 2020).

Teaching and learning are a process where teachers' interaction with peers, materials, and teachers results in change of behavior and thinking. Mobile learning is the concept of delivering educational activities using mobile devices that create a new kind of a participatory medium to encourage multiple learning types, including social learning. Mobile learning and its applications have significantly penetrated African countries and holds tremendous potential in future. It is utilized in other learning methods such as formal and informal learning, distance learning, classroom learning, and other educational levels such as K-12 and higher education. Lo and Hew (2017) stated that while the popularity of mobile learning devices increases day by day, many researchers utilize this technology in their learning environments. Mobile technologies brought changes in the learning and working spheres because of their features such as independence of time and place (Heo and Han, 2018). Mobile learning provides teachers with independency on place and time instead of fixed classroom environment. This is a great benefit for teachers in remote and rural areas who cannot go to school because of infrastructure and environmental

challenges. Helen and John (2019) conducted feasibility study of mobile learning in rural and underdeveloped out-of-school settings to investigate the readiness of rural teachers' use of mobile devices to access educational content and the result of their study indicated that educational learning levels and the motivation of teachers towards the course would increase.

## **2.2. Mobile Learning tools**

Mobile learning is the most discussed and beneficial tool that is used in ICT. It is recognized to be a fundamental element that contributes in embracing teachers during formation of information, which is conflicting with the traditional learning methods that were ineffective. It has been defined differently by countless researchers, similarly, maintaining their viewpoints with individual sense which is comparative to the character it describes in the learning environment.

Mobile learning has countless definitions, some being educational and others being practical(Grant, 2019). Kaliisa and Picard (2017); Keengwe and Bhargava (2019) defined mobile learning as a learning model that utilizes electronic learning and mobile technologies. Darmaji et al. (2019b) defined mobile learning as a model that grants teachers access to learning resources at anytime and anywhere, through countless mobile technological tools. The notion of anytime and anywhere can be attained if teachers could ensure that they involve learners by designing syllabus that would keep them learning when they are away from the classroom and at home. The aforementioned concept can be realized if teachers prepare learning materials ahead of time that learners can utilize to play or watch at home. During school period, teachers could then use the classroom period to work through exercises and form supervised discussion groups that could assist struggling learners.

As described by Mashaba (2018), mobile learning grants teachers an expressive and remarkable teaching and learning that is made possible through mobile learning tools like PDAs, smart cell phones, tablets and computers. Matseoane (2016) differs and is of the perspective that this teaching and learning occurs not to deliver electronic learning materials only on mobile devices, but it is also about the improvement of learning and performance of teachers hence supporting their' teaching and learning capacity whenever and wherever they may be.



“Mobile learning” in this study refers to a model of learning that enable teachers and learners to obtain learning materials and other useful information in any place and at any time through the use of a mobile tools (Romero-Rodríguez et al., 2020).

### **2.3. Mobile Learning in Basic Education**

The traditional view of education perpetuates the idea that learning can only take place in a classroom environment with the assistance of a teacher (Dankasa, 2019). However, the growth of mobile learning devices has reached a level that cannot be ignored, and they have promising features that point to their value in teaching and learning in future. According to Kaliisa and Picard (2017), mobile technology and personal computers have the potential to make education broadly accessible, anytime, anyplace. Access to educational resources and the option to study while on the road are concepts that are slowly but surely spreading across society. It is widely acknowledged that the development of mobile devices has significantly altered the world as today, almost every youngster has a mobile device in their hand (Keengwe and Bhargava, 2019).

Although mobile devices are available, learning in Limpopo rural high schools is a challenge and a matter of limited time and resources for communication between teachers. Teachers in rural high schools can benefit as a result of engaging in mobile learning and integrate the mobile technologies. Modern teachers are constantly on the move; therefore, learning must become accustomed to their flexibility (Musitha and Mafukata, 2018). It is vital that learning be effective for success, therefore, effective learning requires being feasible, personalized, able to measure competencies, and to embrace communities’ common values and norms. Adopting mobile learning in schools enables both teachers and learners to access a large library of material on the internet, to access recorded educational video or audio content, and to exchange knowledge using mobile applications (Roberts, 2016). Robert (2016) went on to say that teachers can provide instruction more effectively and raise academic success in the natural sciences, life skills, and mathematics due to the advanced capabilities of mobile devices.

#### **2.3.1 Significance of Mobile Learning**

Higher education institutions and most of grade R to grade 12 teachers are contributing in mobile revolution. There is countless significance of mobile learning. Today’s teachers are digital savvy

and they get more involved and thrive when they utilise mobile devices in their teaching regardless of the method they use. (BYOD) bring your own device.

- i. **Preparing teachers for the Future:** Teachers play a significant role in preparing and shaping learners' future. Mobile technology needs to be incorporated in classroom as these technology devices are not only part of teachers' daily lives, but they are vital part of career paths. The knowledge of utilizing mobile devices is a significant aspect in the increasingly connected world and Incorporating mobile devices and technology in classroom is a significant in order to prepare teachers for the future (Barker, 2018).
- ii. **Provides options of self-study:** Self-study has increased since the outbreak of covid-19 pandemic in South Africa, and most parents are opting for mobile learning and home based learning which can be effective as any category of instruction, teachers reported that their learners' distance learning and self-study are successful compared to the traditional learning (Simonson et al., 2019).
- iii. **Informed learning:** Helen and John (2019) mentioned that gone are the days of searching for information in encyclopaedias. The use of mobile learning in school classrooms will grant teachers and learners instant access to the latest information, news and study materials. Mobile learning will enable teachers and learners to have answers at their fingertips and keep them connected and well informed with the most up to date information. Mobile learning presents a new framework for informed teaching and learning that enables teachers, learners, and librarians to work together responding to the need to help learners use information in their learning.
- iv. **Alternative to textbooks:** Benoit (2018) suggests that the traditional source of information for learning has mainly been the textbook; however, more dynamic approaches to learning should be put into consideration to capitalize on a variety of perspective and accessibility. Teachers' knowledge can be improved through familiar channels, while being engaged at any place and time that is most convenient for the teachers and learners, Textbooks are not the utmost relevant sources of information and they cannot provide the most recent information as compared to the mobile devices. Today's generation teachers have grown and adapted to updated and instant information. Mobile devices have the privilege to offer digital textbooks that are constantly updated, helpful and are cheaper than heavy physical

books. These keep teachers' organized and offer them easy access to study materials, Personal digital assistants (PDAs), laptops, and other mobile devices have developed to the point that they may now be used as learning tools in both outdoor and classroom settings. (Barker, 2018) .

#### **v. Learning goes outside of the classroom**

The usage of mobile learning in school expands learning outside of the classroom. Teachers do not only rely to information accessed only during computer lab period that has become extinct. They can search for information at any time and any place on campus (Mwapwele and Roodt, 2018). Teamwork will increase as teachers and learners are able to use these mobile devices as learning tools during group work and projects. Teachers are technology fanatics and they are likely to be motivated and continue to prepare learning after school hours. Digital textbooks and learning applications on mobile devices permit teachers to engage in extra learning and studying in during downtime.

Mwapwele and Roodt (2018) argued that if teachers are certainly engaged and excited in learning inside the classroom, they are likely to continue learning outside classroom by utilizing mobile technology. Mobile technology can significantly transform learning into something more engaging and enthralling. Learning can become learner-centred and inherently spontaneous when moved from the boundaries of the classroom into the world at large.

### **2.4. Factors towards Mobile Learning Readiness**

Assessment of mobile learning readiness helps teachers build mobile learning readiness, which is defined as people's capacity to benefit from mobile learning, including their physical and mental readiness to advance learning. Mwapwele et al. (2019) suggest that readiness must be determined first before a school can introduce mobile learning. Therefore, readiness is how a school is prepared in taking several aspects into account to implement mobile learning. The factors that might be taken into consideration when assessing a teacher's readiness are: the teacher's ICT proficiency, classroom management, self-motivation, independence in learning, advanced reading and writing skills, proactive approach to learning, and overall attitude toward the learning experience (Reddy et al., 2017).

Researcher Chipangura (2019) indicated that mobile learning readiness is a process of learning accomplished by teachers who are ready to and prefer the use of mobile technology as a learning environment. Chuchu and Ngoro (2019) stated that mobile learning readiness is a willingness to use mobile technology as learning applications by which teachers access to mobile devices (not only phones) and can afford to subscribe internet data to meet their requirement in the learning process.

#### **2.4.1. Factors influencing readiness of mobile learning**

The following are factors related to the readiness of mobile learning:

- I. Culture readiness:** Culture refers to a set of shared approaches, values, goals, actions and practices that portrays an organization (Grant, 2019). Culture naturally develops and repeatedly reflects the values of those who have put together the organization. Organizational culture is a set of shared values, assumptions and beliefs, which manages people behaviour in organizations (Chipangura, 2019). These shared values have a solid effect on people in the organization and dictate their need for change readiness, how they act and perform their works. An organization with learning culture believes that systems influence each other and inspires constant learning. Therefore, culture readiness affects the organization and their need for change readiness to use a new system.
- II. Environmental readiness:** The most important basics of a learning institution is the learning environment(Chipangura, 2019). The environmental conditions influence the facilitation conditions, should the mobile learning be implemented Environment should support mobile learning by offering a supportive culture, good infrastructure, motivations, resources and frameworks (Grant, 2019). Mobile learning signifies a revolution; therefore, the successful adoption of mobile learning requires a sufficient structure and an appropriate environment.
- III. People readiness:** Since mobile learning is implemented by people, people are an important factor in determining readiness. As a result, people influence deals with personal characteristics, and the more experienced teachers working at the department of basic education as an organization are, the more successful their

implementation of mobile learning will be (Shorfuzzaman et al., 2019). It is significant to discover teachers' readiness for mobile learning, their ICT experience, competency, confidence, and anticipation. In this study, people readiness is considered to influence teacher's readiness for mobile learning. Researchers (Ruxwana and Msibi, 2018) indicate that relevant experiences, skills, attitudes and confidence levels of people who are working with mobile learning may have an influence on the integration of mobile learning.

- IV. Technological skill readiness:** teachers' readiness for mobile learning is impacted by technology ease of use, if teachers use their mobile devices more often and also explore the applications that are embedded in those technologies it becomes easier for teachers to acquire technological skills. The department of education as an organization also plays a significant role by ensuring that teachers are trained to use mobile devices for teaching and learning purposes and that will influence their readiness. When mobile learning is implemented in an organization, requests relating to the systems used to participate in the learning process need to be set apart furthermore to having access to technological devices for mobile learning (Ruxwana and Msibi, 2018).
- V. Content readiness:** When an organization has a need to deploy mobile learning, content is crucial and one of the main issues that must be taken into account (Parsazadeh et al., 2018).

#### **2.4.2. Factors towards teachers' mobile learning Readiness**

Some of the studies carried out on teachers' mobile learning readiness indicating that individual achievement and satisfaction in the mobile learning environment (MLE), mainly depend on several individual qualities (Parsazadeh et al., 2018). The specific qualities which are mandatory for the adoption of a new technology are: learning preferences, technical skills, computer self-efficacy, and attitude towards technology (Chisango et al., 2020). Teachers having attained technical skills can engage themselves better in the usage of a new technology than those who do not have the abilities. As pointed out by Wongkhamdi et al. (2017), the teachers who are well familiar with the usage of technology before enrolling for a course reported less frustration and anxiety compared to those who are not familiar with it.

According to Kaliisa and Picard (2017), the inability of teachers to completely grasp and prepare for the use of digital tools or technology to promote learning has been clearly stated. As a result, people are still reluctant to use mobile learning. A person with innovativeness and optimism little discomfort and insecurity is more likely to use a new technology (Sullivan et al., 2019). People's behavior differs, therefore, their beliefs and theories about several aspects of technology also differ. The relative strength of each trait indicates a person's openness to technology. TRI thus reflects a set of beliefs about technology but is not an indicator of a person's competence in using it.

Ruxwana and Msibi (2018) illustrated that the researcher will be able to identify the factors and the gaps for deploying mobile learning environments efficiently by using teachers' assessments of their readiness. These factors might include, but not be limited to, cultural, personal, educational, political, organizational, psychological and social factors.

The significant factors that define the success of implementing new revolution in the education context is the degree of teachers' readiness towards the adoption of the technology (Suhail, 2017). Due to greater familiarity with mobile learning systems and higher ownership of mobile devices, University students may be ready to adopt mobile learning faster than K-12 students (Lo and Hew, 2017). There is a need to assess teachers' readiness For mobile learning to succeed in higher education and achieve its aim (Kumar and chand, 2019).

Several studies have been conducted to examine teachers' readiness for mobile learning. Al-adwan et al. (2018) examined the use of mobile learning in two educational institutions namely; the University of Trento, Italy, and the University of Ruse, Bulgaria. Teachers were examined about mobile devices availability, their views on systems of learning and the services that mobile learning should supply. The outcomes indicate that teachers' attitude toward mobile learning depends on the approach they have utilized in E-learning. For instance, teachers who use E-learning devices are comfortable to use portable learning devices and have a positive attitude regarding mobile learning. Teachers expect mobile learning to provide services that incorporate E-learning solutions. The costs of the appropriate device including the expense of the services being provided are significant factors for the adoption of a successful mobile learning system. With regard to the gender, the study discovered that male teachers were more interested in

utilising mobile learning system than female teachers who specified a preference for the old class-based approach to learning.

## **2.5. Related work**

Barreto (2018) considers mobile learning to be the relationship between electronic learning and mobile computing and suggests that teachers should learn in the same manner that students play. Learning should be facilitated everywhere, including at home and in leisurely locations in addition to a classroom. Play based learning creates a space whereby children are playing free to analyze, experiment, explore and solve problem using their capabilities such as imagination and curiosity, hence learning must be practical for teachers. The flexibility of learning at any time and any place is one of the unique features of mobile learning (Carter and Killam, 2019). However, Barreto (2018) further argued that there is a limit to what teachers can do when utilizing mobile phones for learning purposes. There are constraints of cost associated with downloading of multimedia content which limit students' utilization of mobile devices for learning purposes and, besides, some teachers are not aware of the capability of their smart phones.

The majority of South African teachers reside in rural areas where there is poor infrastructure of technology, asserts Mtebe and Raisamo (2017). The outcomes of Mtebe and Raisamo model project imply that:

- I. South African teachers are exposed to mobile computing.
- II. Schools that use technology can best accommodate teachers who live in remote areas.
- III. Limpopo rural privileged school may use mobile learning.

According to Mtebe and Raisamo (2017), compared to online learning, mobile learning is more efficient, flexible, and mobile. Numerous studies have focused on mobile learning and the teachers' readiness to use these devices for learning. Keengwe and Bhargava (2019) and Kaliisa and Picard (2017), who have looked at teachers' readiness for mobile learning, came to the conclusion that it is the primary factor of mobile learning implementation. A few research attempts are described in this area. Various frameworks on teachers' technology readiness and mobile learning readiness were established by these numerous researches.

In Nigeria, studies show that, although mobile learning has not yet been implemented in colleges of education, students are confident that mobile learning will be beneficial to them, and have subsequently expressed their readiness to adopt it and are willing to adopt mobile learning if it is introduced in the institutions(Chaka and Govender, 2017).

Similarly, in Kuwait research results indicate that lecturers and students both had positive views of mobile learning, and they agreed that mobile learning can improve the teaching and learning process. However, it was identified that social, cultural and teachers' readiness issues might be the barriers to the adoption of mobile learning (Suhail, 2017).

In Malaysia, Mahat et al. (2020) conducted a study and the results showed that teachers have individual innovativeness and are ready to embrace mobile learning as an important part of their learning process.

In Pacific Islands, a study revealed that the secondary school teachers are ready to use mobile devices for learning purposes and a notable percentage of teachers have started to use mobile devices for learning. However, there are also teachers who have not used mobile learning devices due to owning mobile devices that do not have advanced features. Furthermore, this study identified that teachers are largely proficient in using mobile devices for learning purposes and it was concluded that the secondary school teachers in Pacific Islands are ready to adopt and use mobile devices for learning(Reddy et al., 2017).

In Thailand, a study conducted by Wongkhamdi et al. (2017) shows that during the time of mobile learning acceptance, most of the respondents believed that mobile learning will offer them new approaches to learning and believed that mobile learning will enhance the quality of learning and also to use their own mobile phone for their own learning.

In South Africa, the outcome of a study showed that the intention of schoolteachers to adopt mobile learning is positively affected by the perceived usefulness. Teachers own and are familiar with the countless mobile learning-related resources of smartphones; they possess the skills needed for the adoption of mobile learning that creates a positive perception regarding usefulness and ease of use of mobile learning. This study further noted that smartphones are similar to mobile computers that users carry in their pockets offering them access to learning material anywhere



anytime, which results in an overall increase in users' productivity and convenience (Mutono, 2017).

Alrajawy et al. (2018) studied the approach towards use of mobile devices for learning among students in a Malaysian university. The outcomes indicated that students were fully ready for mobile learning and they expected that mobile learning possibly will be a widespread trend within years to come. They also stated that mobile learning will be a useful supplementary tool for making the process of learning more enjoyable.

The results of a study conducted by Shorfuzzaman et al. (2019) indicated that students identify themselves as mobile teachers. They are also of the view that mobile learning would benefit them to organize their time more efficiently and to intensify their interest in learning.

As the above examples specified, several studies have been conducted in diverse countries to investigate the usage of mobile devices for learning purpose. The outcomes of these studies confirm that there is an extensive utilization of mobile devices among teachers. Yet, these studies mainly specify that teachers are not ready yet to adapt mobile learning technology in their studies; they believe that mobile learning will mature as a new learning technology in the near future (Sun, 2019).

Similarly, other researchers have recommended that institutes of basic education need to provide a technical support and high level of infrastructure to aid the adoption of mobile learning within schools. Chisango et al. (2020) suggested that educational institutions should provide an additional informal learning environment for teachers. Matseoane (2016) encouraged educational institutes to be in a good partnership with mobile industrialised companies, like programmers and mobile telecommunication operators, who can design and develop mobile learning applications. Moreover, technical decisions must be prepared in a way that permits the learning materials development and make them accessible on mobile devices (Helen and John, 2019). Thus, educational institutions may overcome the technical issues and supply teachers with comfortable and useful learning prospects. Mahat et al. (2020); Mutono (2017); Reddy et al. (2017); Suhail (2017); (Wongkhamdi et al. (2017)) are in agreement that mobile devices can be used for learning purposes and teachers who are in possession of smartphones are skilled and their level of readiness to use their devices for learning purposes is high.

## 2.6. Related IS theoretical framework

The basis for many researches has been the need to identify and define the factors that influence technological readiness and its assessment. In this view, two models have been the focus of several studies. These models are the technology readiness index (TRI) and the technology acceptance model (TAM) (Kaushik and Agrawal, 2021).

The theoretical frameworks used in this study assist in determining the research model. The two theoretical frameworks that support this research are TAM (Technology Acceptance Model) and TRI (Technology Readiness Index framework). There are additional theories that highlight the link between the listed factors.

Theoretical framework introduces and describes the theory which explains why the research problem under study exists. There are several theoretical frameworks that have been developed and utilized in the readiness, adoption of technology, acceptance and use Al Kurdi et al. (2020), Amongst them are the Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Technology Readiness Index (TRI), Theory of Planned Behavior (TPB), Innovation Diffusion Theory (IDT) and The Unified Theory of Acceptance and Use of Technology (UTAUT). The theories have been extensively utilized to explain mobile learning readiness and the adoption of technology.

Petrozza (2020) noted that people who embrace and apply new technologies in an organization to achieve organizational goals are referred to as being technology ready. This could include, but is not necessarily limited to, identifying and developing appropriate technological applications and ideas; perceiving and reporting fundamental ideologies that integrate both hardware and software to be used; testing and assessing crucial functioning with relation to the environment; and displaying prototypes and real systems inside those environments. It is crucial to remember that using technology that is still in its infancy has dangers similar to those associated with innovation.

Given the many advantages outlined, any educational organization's choice to transition to mobile learning-based platforms is not a bad choice, particularly in view of the COVID-19 epidemic (Ali, 2020). It is speculated that in established countries all IT departments are preparing to implement or have already implemented mobile platforms of learning, However, this proves

inadequate in developing countries and universities. As suggested by Qazi et al. (2021); and Qazi et al. (2021), because technology readiness is a major approach for benefit realization, it must be assessed. Through this study, the Limpopo Basic Education will get fair recommendations from external suppliers on mobile learning technologies that might be used effectively. Sabir et al. (2020) uncover the fact that technology readiness is a good sign of success. As a result, all important characteristics of preparedness should be clearly identified and specified. The researchers go on to say that, although technology and architecture are widely acknowledged to impact preparedness, there are various other variables that educational organizations should consider for a successful deployment.

Numerous studies have always been conducted in that area with the aim of identifying and describing the factors that influence as well as to address the readiness of technology and its assessment. Many studies have focused on these two hypotheses in relation to perception and the technological readiness index (TRI) and the technology acceptance model (TAM) are the two ideas in question (Kaushik and Agrawal, 2021). The diffusion of innovations (DOI) and the combined TAM/TRI model are two further approaches that have not been utilized much (Nwanmereni, 2020).

This study used TAM and TRI model for the investigation of teachers' readiness of mobile learning adoption.

### **2.6.1. Technology Acceptance Model (TAM)**

TAM has been used by Zaineldeen et al. (2020) to determine users' behavior in accepting technology. This model is one whereby the perceived usefulness and perceived ease of use of an information system has been shown to affect the use of technology. Teachers' readiness and acceptance to use mobile devices for teaching and learning purposes is the main factor that results into failure or success of a technology. Factors influencing teachers' behavior will be determined through readiness assessment for the successful acceptance and usage of mobile learning.

The figure below uses a Venn diagram to represent the features of the FRAME model, with three attributes (learner, device, and social) overlain with three connections.

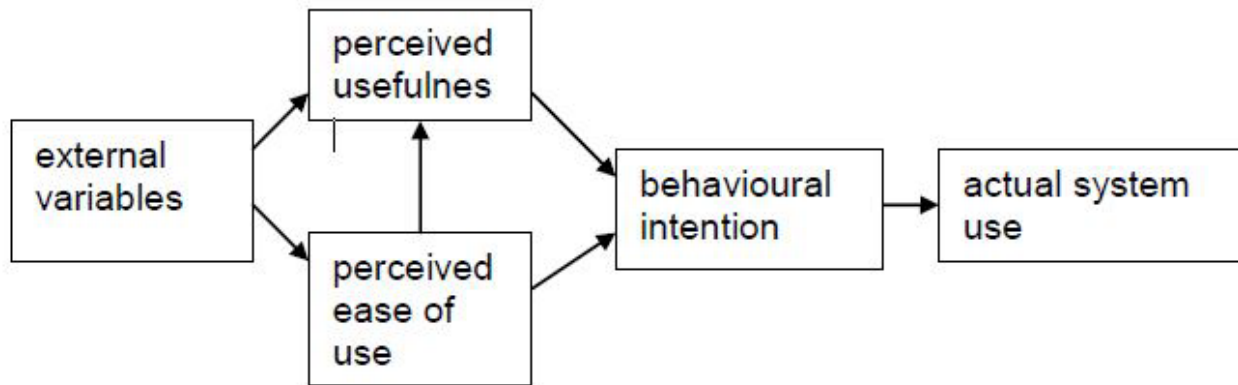


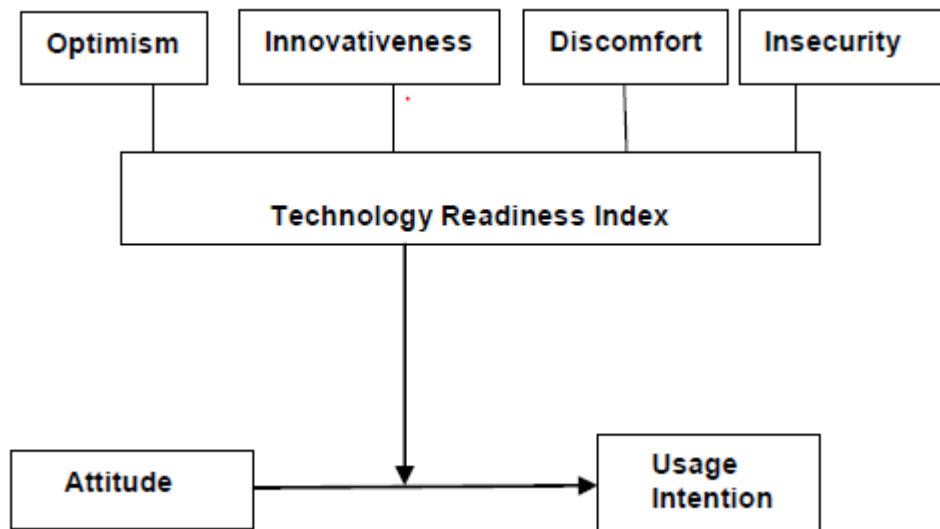
Figure 2. 1 : (TAM)Technology Acceptance Model

### 2.6.2. The technology readiness index (TRI)

BakirtaŞ and AkkaŞ (2020) opined that technology readiness index (TRI) is a framework that relates to technologies in general. It analyzes and measures negative and positive, beliefs and readiness to use new technology by means of the following four factors and personality behaviors:

- I. Optimism - a positive view of technology that confides in the increased control, flexibility in life due to technology. This refers to viewpoint and the expected technology performance.
- II. Innovativeness - a tendency to be the first using a new technology. It relates to personal or individual beliefs that need to be carried out by a leadership role in the society. It embraces persons competency to voluntarily roles.
- III. Discomfort – perceived lack of control over technology and a sense of being overwhelmed. This also refer to individuals’ perception that they do not have control over technology.
- IV. Insecurity - a lack of trust in technology and concerns about its viability for security and privacy reasons (Mohit Kant and Devika, 2021). This construct refers to the individual uncertainty of technology. With insecurity technology end users will develop a point of view that they will never conquer accuracy of technology.

The figure (Figure 2.2) below clarifies the technology readiness index as explained by (Kenett Ron et al., 2020). Furthermore, the original TRI that has been improved by several researchers enable the model to comprehend the study at hand(Setati and Paledi, 2019).



**Figure 2. 2: Technology Readiness Index Model (TRI)**

People are exposed to changing environments, conditions, and technology, and their behavior changes. Optimism and innovation are indicators of technological readiness. A high optimism and innovativeness score will improve overall technological readiness. Technology readiness is constrained by discomfort and insecurity. As a result, a high score on these proportions will result in a decrease of the overall technology readiness. Results in Dlamini et al. (2019) demonstrates that all TRI dimensions are impartially independent, and each has a distinct impact on an individual's technological readiness.

## 2.7. Research Model

Davis (1989) created the Technology Acceptance Model (TAM) from the Theory of Reasoned Action (TRA), a psychological theory that aims to explain people's actions by establishing a causal connection between various components: beliefs, attitudes, intents, and behaviours. TAM is one of the most influential models widely used in studies of the determinants of user acceptance and usage behaviour of information technology because it has been effective in modelling IT acceptance and has received extensive empirical support through studies predicting information system use (Reyes-Mercado et al., 2022). Based on the Theory of Reasoned Action (TRA) (Kampa, 2023), TAM hypothesizes that perceived usefulness and perceived ease of use construct have an impact on a person's intention to use a system, with intention to use interacting as a mediator of the actual system's utilization. The degree to which a person perceives a system to be beneficial when utilizing it is referred to as perceived usefulness. It is thought to have a direct impact due to perceived ease of use. TAM has been modified by certain researchers ((Kampa, 2023);(Cao and Nguyen, 2022); (Mufidah et al., 2022)) by substituting the attitude construct obtained from TRA. In particular, the behavioural constructs in both TRA and TAM indicate that if an individual develops an intention to use, they will be free to use as much as they require.

They compete in the prediction of user behaviour. TAM conveys thorough information on the factors that are significant to a user's choice-making process. However, other scholars (for example, ((Natasia et al., 2022); (Alismaiel et al., 2022); (Vorm and Combs, 2022)) have claimed that TAM's constructs may not be applicable in all contexts and with every organization. It is also restricted in its ability to explain external factors such as time, environment, organizational, and individuals' factors. However, such factors must be addressed before a new or changed technology is used. People may obtain some comfort and view existing technology as easy to use rather than accepting and getting used to a new one (Kampa, 2023).

According to several studies, readiness is a measurement of technological relevant innovation to the modern system in a certain organization's setting. The dangers associated with innovation are decreased by substantial readiness. As a result, using a well-known quality model is the best way to confirm this prediction. Dlamini et al. (2019) said that a research model need to be utilized for examining organizational readiness. This has served as the benchmark for countless readiness frameworks used to assess technological readiness. The analytical hierarchical arrangement of

identifying constructs and related indicators, that has been frequently used in studies on technological readiness assessment, forms the foundation of this study.

As discussed by Bakirtaş and Akkaş (2020), technology readiness index (TRI) is a framework that analyzes and measures negative and positive, beliefs and readiness to use new technology by using four factors and personality behaviors: optimism, innovation, discomfort, and insecurity. Optimism is a positive view of technology, it is also the hopefulness and confidence about the future or the success of something (Mohit Kant and Devika, 2021) for that reason the Optimism has been substituted with Need change readiness. Innovation is a tendency to be the first using a new technology, and organizations need to be innovative and ready to use the new technology in learning, therefore Innovative has been substituted with Organizational Readiness, organizations similar to the department of basic education need to be innovative to ensure teachers readiness for the acceptance and use of mobile learning. Discomfort is a sense of being overwhelmed, and insecurity is a lack of trust in technology and concerns about its viability. discomfort was substituted with Teachers readiness. Age, level of education, and the skill of utilizing the mobile devices causes discomfort to teachers who are not ready for a change. With insecurity, technology end users will develop a point of view that they will never conquer accuracy of technology. This construct refers to the individual uncertainty of technology. With insecurity technology end users will develop a point of view that they will never conquer accuracy of technology.

### **2.7.1. Need Change Readiness**

Ilorah et al. (2017) defined Need Change Readiness as implementers' recognition of challenges in obtaining and delivering learning services, aggravated by a combination of real or authentic demands based on expressed dissatisfaction with current procedures. The goal of the need change readiness is to determine the key attributes of the target group.

For the change, there is a need for identification and satisfaction, users' dissatisfaction with the current learning system as a result of its lack of availability, accessibility and reliability, awareness that could lead to underutilization of the current learning system, and the ability to learn through technology devices.

### **2.7.2. Organizational Readiness**

Organizational readiness, on the other hand, establishes traits connected to organizational structures. These may consist of existing ICT policies and regulations, organizational culture and work ethics, and resources availability (Nikolopoulou et al., 2022) .

### **2.7.3. Teachers' Readiness**

It is necessary to determine level at which the organization (department of education) and its teachers participate in the networked environment (Muhammet and okan, 2018). The organization's and its members' current degree of mobile learning participation is more likely to impact their future participation. The attributes that moderate the level of participation are: information about the advantages of mobile learning, the users' readiness to learn and gain knowledge about mobile learning impacts and usage and identifying and comprehending the financial advantages of mobile learning.

**2.7.4. *The perceived ease of use:*** This includes attributes such as:

- I. Age, academic background, and networking technology experience are all personal aspects to consider.
- II. Users could discover that modern technology is more user-friendly and enhanced than outdated technology. Some teachers could have more experience in a certain technology than others.

***Perceived usefulness:*** This includes attributes such as

- I. Provided Service quality
- II. Technology users' satisfaction
- III. Expected advantages

***The facilitating conditions:*** This includes attributes such as:

- I. The organization's desire and capability to help users and ICT personnel while implementing and utilizing mobile learning.
- II. The department of basic education has enough employees and capability to provide support and backup services.



Kaliisa and Picard (2017); Keengwe and Bhargava (2019); and Roberts (2016) are of the view that there are documented technological limitations amongst which are small keyboard, low resolution, generalized compatibility and small memory space. Users' psychological limitations have also been pointed out (Jantjies and Joy, 2020); (Creswell and Creswell, 2017). Teachers are not using technology for teaching and learning purposes, but they use technology more for social media relations, entertainment, watching videos and listening to music (Jantjies and Joy, 2020); (Ngesi et al., 2018b).

Regardless of countless advantages of mobile learning as a technology to improve teaching and learning in all education institutions, there are some limitations that need to be reflected as concerns facing its implementation. According to previous researches, the limitations of mobile learning are as follows:

- I. **Technical limitation:** Studies by Musitha and Mafukata (2018); Grant (2019); Ngesi et al. (2018b) showed that mobile devices have limitations due to memory size, small screen, battery life, slow network speed, and limited and small keyboard. Moreover, devices that are utilized in mobile learning may possibly not provide the same design or resolution of contents as a computer (Mashaba, 2018). Furthermore, mobile devices are limited in resources and processing power and they have a selection of different operating systems and input possibilities.
- II. **Users' psychological limitations:** Studies by Chaka and Govender (2017); Matseoane (2016) specified that teachers are more expected to use mobile devices for entertainment habits such as texting friends and social networks activities as well as listening to music rather than for learning purposes.
- III. **Safety and security issues:** Mobile devices are more likely to be stolen and misused, easy to lose and subject to damage. These concerns might be the barriers to teachers from low-income backgrounds owning these devices to collaborate in the learning environment (Helen and John, 2019).
- IV. **Educational aspects:** While mobile devices are integrated in learning, some academic aspects ought to be taken in consideration (Matseoane, 2016). For instance, utilizing mobile devices in class might disturb teachers' concentration and obstruct the learning process.

- V. **Implementation cost:** Mobile devices cost a lot and the implementation of mobile learning infrastructure is expensive. This is in addition to the wireless services need, training and support expenditures for teachers, tool repairs and maintenance budgeting, parents and teachers and all of whom need to comprehend the devices functionality to fully engage in mobile learning process (Benoit, 2018).

Ngesi et al. (2018b) identified some challenges that are essential to be reflected on when implementing a mobile learning system as the following:

- I. **Context:** Mobile learning offers the ability of access to the user's environment information, and this can cause concerns regarding privacy.
- II. **Mobility:** Mobile learning provides a link to activities inside and outside the classroom, anywhere and anytime. This may possibly permit learners to break away from engaging with their teachers and curriculum although it is intended to improve relations between those involved.
- III. **Ownership:** Teachers like the ownership and enjoy controlling their technology devices.

## 2.8. Operationalization of the model

The conceptual framework in Figure 2.3 has been enhanced to illustrate the relations between constructs. A research model was created using the modified framework and the proposed hypotheses (H). According to Natasia et al. (2022), when users are ready for a new technology, TAM shows that a variety of factors influence the decision they make about the process and the time spent using it. The researcher further mentioned that individuals forms an intention to act, with the expectation that they will be free to act without constraint; however, in the real world, there will be several limitations, such as limited abilities, time constraints, organizational or environmental limits, or unconscious habits, which limit the freedom to act. According to Kampa (2023), technology Acceptance Model is an implementation of the Theory of Reasoned Action (TRA), which established two principles, namely perceived usefulness (PU) and perceived ease of use (PEU). The researcher stated that PU is "the degree to which a person believes that using

a particular system would improve his or her job performance." The researcher also defined PEU as "the degree to which a person believes that using a specific system would be free of effort." Undeniably, a considerable body of TAM research has shown that perceived usefulness is a strong predictor of consumer acceptance, installation, and practice behavior with individual professional users different from other technology users. The researcher holds that technology acceptance is more complicated than initially thought, and have studied other variables that stimulate acceptance. According to Kampa (2023), TAM has two paramount and prominent themes which are parsimony and instrumental determinants. The slimness of the model is also measured as its fundamental restriction, while the ungenerousness of TAM makes it relaxed to relate to a variety of conditions. Alhasan et al. (2023) argued that although these major premises have provided the technology acceptance stream well, perceived ease of use and perceived usefulness are not the only valid determinants related to technology adoption, particularly with newer technologies. In addition, many researchers like Gupta and Yadav (2022) have extended TAM by incorporating new constructs into the model. On the other hand, some studies were conducted after dropping a few factors from the original TAM (Gerli et al., 2022). As a result, this study has modified the TAM and TRI by dropping and adding new constructs to assess the teachers' readiness of mobile learning in high schools in Limpopo department of education where readiness is treated to be similar to intention to use. The following hypotheses were proposed for each of the relationships:

**H1:** Need change readiness will influence mobile learning readiness in South African rural high schools.

A crucial component of every IT innovation within the organization is the readiness for change and change management. Every change must be handled carefully to minimize its negative effects on the organization and its employees, especially teachers in the case of a school (Al-hunaiyyan et al., 2018). Need change readiness is a current concern affecting higher education and the need for change are investigated, this is connected to understanding organizational culture, leadership style, and change readiness. Gerli et al. (2022) define change as a process that results in changes in the behavior patterns of individuals and organizations; the researcher also defines change as an activity or process that causes something, a person, group, or organization, to differ from its previous condition. Change is a common thread that must be traversed as part of the life of every individual and organization in order to grow, develop, and adapt to future situations. So, change is a process of transition or displacement that results in

changes in the behavior patterns of people, organizations, and societies. Change readiness is a multidimensional, multi-level, complex phenomenon. Readiness is one of the most critical criteria in people's early support for change initiatives.

**H2:** Organizational readiness will influence mobile learning readiness in South African rural high schools.

Organizational change readiness is a fundamental requirement for successful change implementation. The readiness of an organization for change influences its intention to use any new technology (Alnoor et al., 2020). The ability of the organization to create skill sets for achieving a goal and affect multiple activity choices, effort, perseverance, and Changing one's self-efficacy is an accomplishment. Changes in usefulness of mobile learning in higher education, on the other hand, do not give support for change readiness based on the belief that change has benefits. Training and the resource need to be provided in preparation for the readiness, acceptance and usage of mobile learning (Mashaba, 2018). Therefore, the educational organizations need to be ready for mobile learning.

**H3:** Teachers' readiness will influence mobile learning readiness in South African rural high schools.

Suitability can be determined by teachers' understanding of mobile learning devices as well as whether or not they have the skills to use mobile devices as a teaching tool." According to Nikolopoulou et al. (2022), incorporating mobile technology into teachers' present teaching, readiness should be examined and studied in the learning environment. Teachers can use mobile learning and teaching technologies to collect and assess learners' learning performance. Many activity choices, effort, determination, and achievement are influenced by teachers' self-efficacy. The psychological evaluation of teachers in the department of education is based on three implementation capacity determinants: job demands, resource availability, and situational circumstances determine change readiness. Majority of teachers in both developing and developed nations have individual access to influential communications technology, which opens up exciting educational opportunities (Chipangura, 2022). Mobile devices may be utilized for educational purposes among teachers and educators. Teachers play a vital role in building an educational process that incorporates mobile learning, which is necessary to successfully train teachers as well as recruit their own support. As a result, teachers have an important role in

promoting high-quality learning with mobile technology the researcher contend that teachers desire and readiness to implement and use mobile learning devices are crucial success factors and mentioned that Teachers who utilize mobile devices in class have significantly higher positive perceptions (Al-furaih and al-awidi, 2020).

**H4:** Perceived ease of use will influence mobile learning readiness in South African rural high schools.

perceived ease of use has significant influence on intention to use (Ong, Lai, & Wang, 2004; Venkatesh, 2000; Wang et al., 2006; Yoon & Kim, 2007). However, perceived ease of use had a large direct influence on intention, although in a negative direction (Islam, 2011a). As a result, it is speculated that: Mobile users' perception to use mobile was influenced by perceived usefulness and perceived ease of use (Alshurideh et al., 2019).

**H5:** Perceived usefulness will influence mobile learning readiness in South African rural high schools.

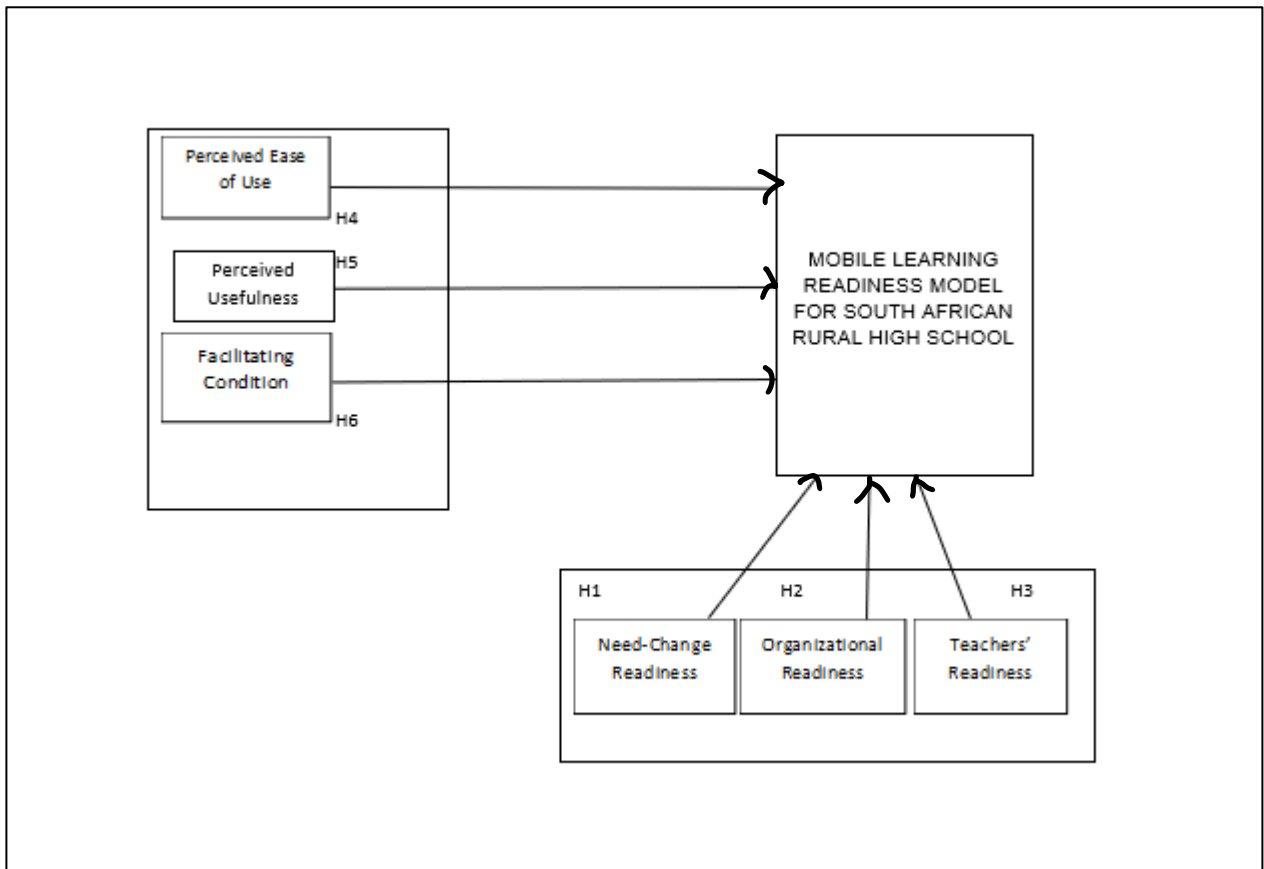
Perceived usefulness is a system in which users believe that if they utilize this specific system, their work performance would improve. Zaineldeen et al. (2020) discovered in his research that perceived usefulness is the degree to which a customer believes consuming a given way will improve his or her work performance. Kaushik and Agrawal (2021) conducted a study to determine the extent to which the TAM was capable of elucidating the organizations acceptance of online education. "TAM suggests that perceived usefulness is an important determinant of user attitude toward technology acceptance, which can lead to intention to use and actual usage. the researcher stated that emphasis should be placed on increasing the perceived usefulness of mobile learning devices, which is possible through the creation of effective course content." According to Almaiah and alismaiel (2019), perceived usefulness is the subjective perspective of users in which they perceive that employing particular technologies can increase the performance of their task.

**H6:** Facilitating conditions will influence mobile learning readiness in South African rural high schools.

The degree to which a person feels that organizational and technological infrastructure exists to facilitate the usage of a system is referred to as facilitating conditions (Mutambara and bayaga,

2021). Facilitating conditions and social influence Variables have a positive influence on teachers' behavioral intention throughout the acceptance process of mobile learning. Self-directed learning, learning readiness, effort anticipation, and expectations for performance, social influence, and facilitation conditions also play a role in predicting mobile learning intention and usage behavior. Perceived ease of use, attitude toward mobile learning, subjective norm, perceived usefulness, Perceived ease of use, and area of influence are all characteristics that impact mobile learning adoption(Camilleri and Camilleri, 2022). Other elements influencing mobile learning adoption include relative benefit, complexity, social impact, perceived fun, and self-management of learning.

This similarity resulted in the development of the research model shown in Figure 2.4 below.



**Figure 2. 3: research model**

## **2.9. Summary**

The chapter reviewed literature related to this study, along with the framework and models that were beneficial in developing the research model for this study. Frameworks and models from TAM and TRE were considered.

## CHAPTER 3:

### CHAPTER 3: RESEARCH METHODOLOGY

This chapter presents the methodological approach utilized in this study. It focuses on the theoretical background of the approach. It carefully analyses the services for collecting the data and explains why a certain approach was chosen to be used. The description of data analysis methodology is presented, followed by a discussion of the tool's reliability and validity, as well as quality requirements.

#### 3.1. Research Philosophy

A research philosophy is a set of beliefs and assumptions regarding the development of knowledge. Although this may seem sophisticated, it is precisely what a researcher do when embarking on research: developing knowledge in a particular field. Taherdoost (2022) mentioned that the knowledge development the researcher embark upon may not be as dramatic as a new theory of human motivation, simply by solving a specific problem in a specific organization, it is considered as developing new information. Each stage of the research process is based on assumptions about information sources and knowledge type. The research philosophy will represent the author's key assumptions, which will serve as the foundation for the research plan (García portilla, 2022). In general, research philosophy has various branches that are connected to a variety of fields. There are four major research theories within the area of studies in particular: Pragmatism, Positivism, Interpretivism (Interpretivist) Realism. The practical consequences influence the selection of a certain research philosophy. Therefore, this research was based on the on the positivist paradigm.

##### 3.1.1. Research Paradigms

This is how the researcher approaches the study. The paradigm describes the researcher and what is and not included in the study's scope of the investigation (Camilleri and camilleri, 2019); (Lestari et al., 2019). Depending on the research, researchers from various backgrounds may have distinct paradigms. As a result, the study at hand should provide a thorough grasp of the primary research paradigms, allowing the researcher to make a better decision among the



Positivism, Interpretivism/Constructivism, Pragmatism paradigms and Critical Theory. The questions to be answered by the researcher also play a significant influence in the selecting process. The positivist paradigm was applied in this study.

Caldwell (2015) as cited by Easterday et al. (2018) examines the positivist and interpretative research paradigms as two alternative research paradigms. The researcher describes the positivist paradigm as one that believes that truth or reality is provided objectively; and as a result, it is used in studies that test theories as well as predict the outcome, as may be measured via hypothesis offered. In contrast, the interpretivism paradigm is described as a paradigm that aims to understand a phenomenon by the meaning that participants assign to it. This paradigm does not include dependent and independent factors; nevertheless, the paradigm focuses on how the human interprets the scenario that occurs (García portilla, 2022).

The positivist paradigm was used in the current study because of the quantitative approach used. From the perspective of positivism, reality is assumed to be objectively provided and may be defined by quantitative characteristics that hold true regardless of the researcher's methods or tools. This study aimed to develop a research model to determine how best to meet the needs of high school teachers in Limpopo province in terms of their preparedness to use mobile learning.

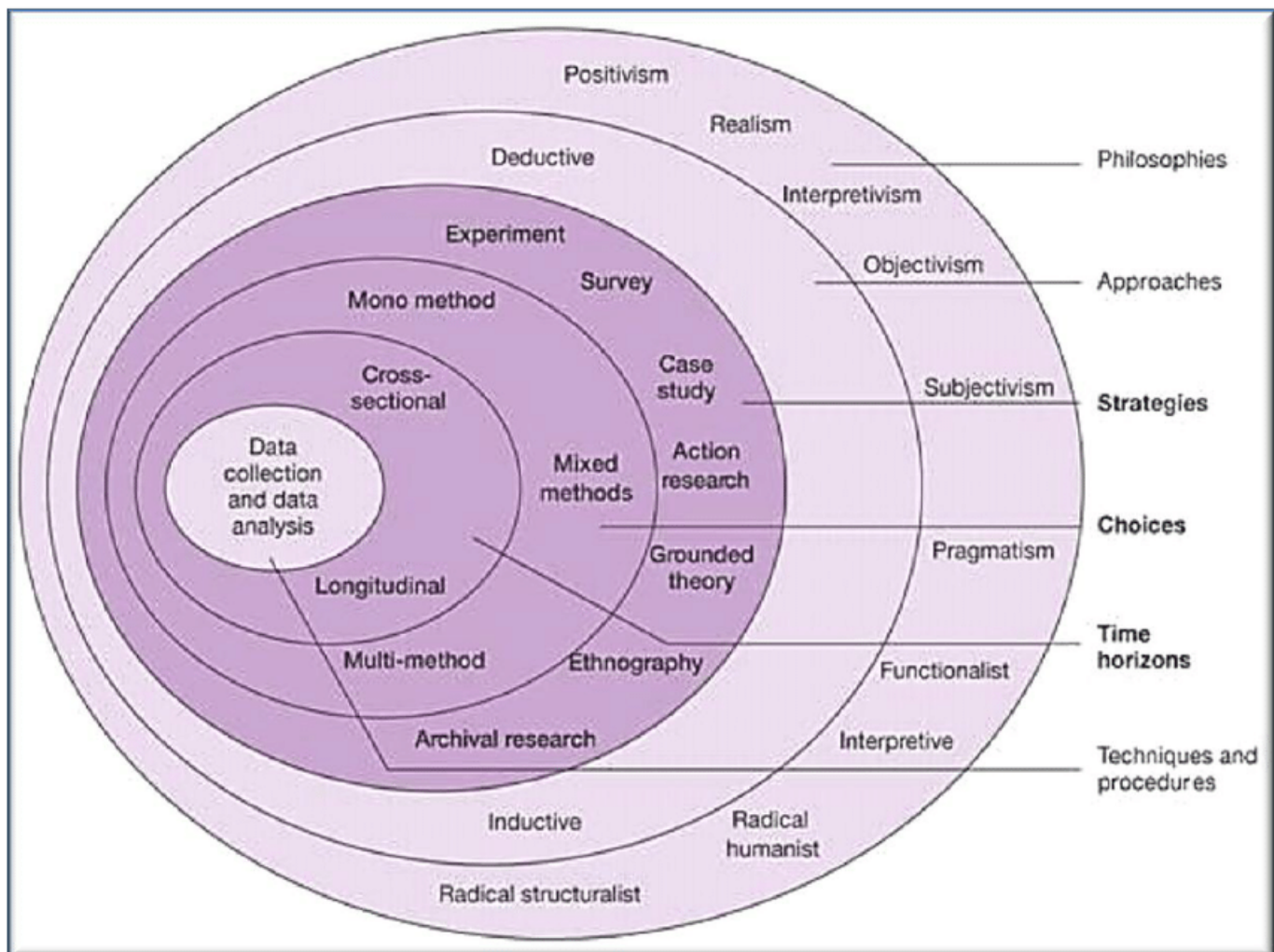


Figure 3. 1: Research onion, research designs and research studies

### 3.2. Research Approach

In order to reach all participants in this study and data collection from high school teachers, a survey approach was required. To familiarize the researcher with the subject of the study, several related research works were reviewed. Along with this literature analysis, the researcher conducted an informal survey with a few teachers from the department of basic education prior to the major survey. This study aimed to develop a conceptual model for assessing high school teacher's readiness in Limpopo for mobile learning. The research involved six schools as a case study. A questionnaire with closed-ended questions was used to collect data. The researcher used these questionnaires to compile a more representative sample of respondents. Quantitative approaches were used to evaluate these elements and to reach the targeted group and efficiently analyze the data acquired from the large sample.

### 3.2.1. Qualitative and Quantitative Research

Ishtiaq (2019) asserts that a researcher may choose between a qualitative and a quantitative approach. The former can be employed when attention must be paid to meanings and processes that do not want to be quantified in terms of quantity, amount, or frequency of occurrences. Qualitative approach is utilized in situations where a researcher wants to know what people are thinking, feeling, experiencing, and comprehending while they are interacting with them during the research. On the other hand, quantitative research can be utilized when a researcher wants to quantify and examine key relationships between variables rather than processes as the basis for the argument. According to Taherdoost (2022), the most crucial component of every research project, regardless of whether it is qualitative, quantitative, or a combination of the two, is to provide a response to the question at hand. In order to make a good choice, a researcher needs to assess the relevant literature while keeping in mind that every scenario is distinctive in its own manner. A combination of the two is preferred because both approaches have flaws that can be made up for by the other, even if quantitative research is more structured than qualitative research. Therefore, a quantitative method was required in order to systematically respond to the research objectives provided for this study.

Quantitative data is numerical in character and may be calculated mathematically. The scales used in quantitative data measurement are categorized as nominal scale, ordinal scale, interval scale, and ratio scale. Such data frequently (but not always) includes measurements of something (Rana et al., 2021). Quantitative approaches address the program's 'what.' They adopt a systematic, consistent approach and procedures such as surveys and questioning. Quantitative techniques have the advantage of being less expensive to adopt, standardized so that comparisons can be made easily, and the amount of the effect can typically be assessed. Quantitative approaches, on the other hand, are limited in their ability to investigate and explain commonalities and surprising discrepancies (Creswell, 2014). It is crucial to highlight that for peer-based programs, quantitative data collection methodologies are frequently challenging to implement for agencies due to a lack of enough resources to assure rigorous survey implementation and frequently reported low participation and lost to follow up rates.

Quantitative data gathering methods rely on random sampling and structured data collection tools to categorize a wide range of events (Siedlecki, 2020). They generate outcomes that are simple

to summarize, compare, and generalize. The researcher further mentioned that Random sampling is used to establish population assumptions by selecting a sample of data. It's called probability sampling. This sample's equivalent is non-probability or non-random sampling. This sample includes basic random sampling, stratified sampling, cluster sampling, and multistage sampling. Non-random samples are termed convenience samples in sampling techniques.

According to Bloomfield and fisher (2019), the experience research method is a quantitative approach in which the study quantifies the data to measure the occurrences. The quantitative technique is used to describe logic from the information that already exists as a result of the hypothesis relationships offered by the research as well as to validate hypotheses (Stockemer et al., 2019).

Nardi (2018) asserts that the quantitative method is broad and divided into three categories: experimental, descriptive, and casual comparative. The descriptive method is used to evaluate the existing situation, and it uses mathematical models based on observation or the study of correlations between two occurrences to conduct analysis. Researching the intervention or intervention in the study group and evaluating its effects is the experimental approach. The comparative technique investigates the dependent and independent factors to investigate the interplay of independent variables and how they influence the dependent variables.

In order to achieve the objective of developing a readiness assessment model that can be used in SA high schools across Limpopo province, the study adopted quantitative approach based on its strength of generalization the outcomes and also reducing the bias that emanate from the direct involvement of the researcher in the data collection process (Henson et al., 2020). In addition, based on the objectivism viewpoint, quantitative approach was adopted to test the truth values of the developed hypothesis.

### **3.3. Research Process and Design**

When a study offers a solution to the stated problem, it is said to have significance. (Duliga (2018); Bolinger et al., 2022) concur that systematic methods should be followed to identify a solution to the recognized problem and to answer the specified questions. Following these methodical steps may aid in developing a clear understanding of how the whole research effort is to be managed.

As a result, better tactics must be established, preparation must be completed, and a better framework must be obtained for doing the study, which is referred to as the research design (Huntington-Klein, 2021). The researcher went on to say that the primary aim of a study design is to reduce the possibility of making inaccurate contributing conclusions from data. The study design used should be rational, with all procedures presented in a cyclical manner. The stages indicated by Creswell and Creswell (2003) were followed in the research design for this investigation(Huang et al.). The researcher proposed that a research process consist of six stages namely; issue description, study design planning, planning the sample population from whom data would be obtained, data collection from the selected sample population, data analysis, and conclusion formulation.

The study used deductive reasoning approach towards the development of the model. A deductive approach is concerned with “developing a hypothesis (or hypotheses) based on existing theory, and then designing a research strategy to test the hypothesis”. It has been stated that “deductive means reasoning from the particular to the general. If a causal relationship or link seems to be implied by a particular theory or case example, it might be true in many cases. A deductive design might test to see if this relationship or link did obtain on more general circumstances”. Deductive approach can be explained by the means of hypotheses, which can be derived from the propositions of the theory. In other words, deductive approach is concerned with deducting conclusions from premises or propositions(Huntington-Klein, 2021).

Deduction begins with an expected pattern “that is tested against observations, whereas induction begins with observations and seeks to find a pattern within them”. The goal of this research is to develop a mobile learning readiness model for South African rural high schools. The research model was created after reviewing relevant literature. Based on the study methodology, a questionnaire with closed-ended questions was developed. With the use of the Statistical Package for Social Scientists (SPSS v28.00), the data was statistically analyzed.

### **3.4. Research Strategy**

A research strategy, as defined by Bolinger et al. (2022), is an overall plan developed to answer the research questions posed for the study. In order to efficiently cover the sample size from the

research population, this study used a survey to collect data (sampled from the 2 circuits, 6 High schools of Limpopo Province).

Before the classes began, and during lunch time questionnaires link was shared. The researcher worked with school principals and teachers to determine the best time to collect the surveys at the end of the sessions. Other teachers responded to the questionnaires at their best selected time after school hours.

### **3.5. Data Collection Methods**

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes (Barth and blasius, 2021). The data collection component of research is common to all fields of study including physical and social sciences, humanities, business, etc. A researcher must choose a more effective data gathering approach based on the study topics to be addressed. The information source may also have an impact on the data collecting process, as opposed to secondary data that has previously been collected to address a similar or related issue, while original data gained from the main source may be obtained in a different way. Mutambara and bayaga (2021) mentioned that data is organized into two broad categories: qualitative and quantitative.

According to the research's methodology, a closed-ended questionnaire was utilized to ensure that the information gathered from participants was relevant to the research and could be used to assess the hypotheses put forth for the study.

#### **3.5.1. Questionnaire development**

After developing a research model, constructs that were considered significant to the study were used to create the questionnaire; features of the research model were used to create the questionnaire items; and, depending on the methodology chosen, closed-ended questions were utilized. The questionnaire enabled the researcher to cover all participants and perform a rapid and straightforward analysis of the collected data. A huge sample size necessitated the use of closed-ended questionnaires in order to control the data gathered from many participants.

A five-point Likert scale was employed, with 1 indicating strongly disagree, 2 indicating disagree, 3 indicating neutral, 4 indicating agree, and 5 indicating strongly agree. Furthermore, statistical analysis of the data made it easier and faster to make relevant conclusions.

The distinction between open-ended and closed-ended questions is based on the questions' qualities and phrasing. Closed-ended questions offer the advantages of being concise, simple to respond to, and time-efficient, since they do not need participants to expound on their answers. Closed-ended questions are straightforward to assess and enable the presentation of results. In contrast, open-ended questions are generally unclear and ambiguous, difficult to answer, and time-consuming, since respondents require time to consider and justify their answers. In addition to being difficult to interpret and analyze, open-ended questions make it challenging to draw conclusions (Wijanto et al., 2022).

### **3.6. Piloting the Research Instrument**

The efficiency of the questionnaire and the validation of the measuring items' adherence to their conceptions were both measured. The questionnaire was tested on a total of 10 persons by Mukula Integrated School teachers who are members of the vhembe departments of basic education. Following the questionnaire's piloting, certain questions were changed, and a final questionnaire was created in preparation for final data collection.

### **3.7. Main Survey**

Following the development of the measuring device and the selection of participants, the primary survey was launched. Keeping in mind that the targeted schools had fewer instructors than other schools, questionnaires were created and given to the six secondary schools. The selection of the schools was not informed by any scientific method. The selection was informed by proximity, and willingness of the schools to participate in the study.

### **3.8. Distribution of questionnaires**

A link of questionnaires was sent to teachers of the chosen schools based on the study's demographics. Data were collected from six (6) high schools, these high schools form part of Mutshindudi and Tshinane Circuit from the Limpopo department of basic education. Before the

classes began, questionnaires link was shared. The researcher worked with school principals and teachers to determine the best time to collect the surveys. However, not all the returned questionnaires could be utilized in the analysis because some were incomplete and had to be eliminated as they became invalid.

### **3.9. Sampling techniques**

The Data were collected from teachers across 6 high schools. These schools were chosen for the researchers' convenience. The researcher grew up in Limpopo rural areas and has experienced the difficulties and challenges of attending high school in this area. Managing questionnaires was easier and more convenient at Mukula secondary school. Therefore, it was a not expensive in terms of travel to distribute and collect questionnaires. Furthermore, the researcher enlisted the assistance from many teachers in this area, who gladly helped. On the other side, the Tshivhase secondary was chosen because it has a lot of teachers. The researcher was likely to obtain more representative data. Not all teachers in each school took part in the study. School Principals assisted in distributing a link of questionnaires to school WhatsApp groups. In some schools there were selected teacher who have the admin rights to send communication to all other teachers in those WhatsApp groups.

#### **3.9.1. Selecting participants**

Researchers (Asenahabi et al., 2019) proposed that a sample must be used for the study. While employing classic sampling methods, one can utilize either probability or non-probability sampling. The researchers go on to say that while utilizing probability sampling, a researcher may need to draw conclusions about a population to whom the study questions would be delivered based on the sample. The participants are chosen at random, with the researcher determining the chance of each participant's selection. Probability sampling, when done correctly, has the potential to accurately reflect the population. Non-probability sampling, on the other hand, may give a variety of sample approaches to choose from. According to Hwang and fu (2019), using non-probability sampling, personal experience, ease of use, professional judgment, educational background and training, kind of employment, desire, and comfort of involvement in the study are a few examples. Whenever a researcher chooses to use non-probability sampling, they have a variety of options, including handy, quota sampling, snowball sampling, judgmental sampling, and more.



This study used non-probability judgment sampling, in which the participants were chosen based on some criterion. The current study addressed a group of teachers who are informed about mobile learning. The goal of the research was to assess mobile learning readiness, and the researcher was required to include those teachers who were judged to be relevant to the study.

Participants were chosen from schools using random sampling to assist in the distribution of questionnaires. The selected schoolteachers who have the admin rights in school WhatsApp group sent the link of questionnaires to all teachers.

The researcher emphasized to attendees that participation is not compulsory and that those who wanted to voice their opinions might do so. The participants were also informed that nothing binds them to continue participating if they change their minds. Again, the participants were made aware that they were under no obligation to disclose their choice to leave the research and might omit the questionnaire without fear of repercussions.

Participants were urged to submit the form after completing all questions. The researcher made certain that Principals in the different schools were addressed to assist in distributing the research question link for data collection.

### **3.9.2. Sample size**

Using Krejcie and Morgan (1970) technique for estimating the sample size for a finite population, respondents were drawn from an estimated total population size of 250 within the specified schools. On the basis of the instrument presented in Table 3.1 by (Krejcie and Morgan, 1970) a sample of 152 should be the adequate size. Because this research was conducted at the peak of the Covid-19 epidemic, the questionnaire was transformed into an internet survey and a link was provided to the respondents. In all, 250 URLs were sent using the schools' email lists and mobile apps. 154 complete responses out of the 250 links sent was received. This translates to a 53% response rate. The low response rate was ascribed to schools' restricted access and the fact that not all teachers were available to answer. People had limited access to resources such as computers, the internet, and data during the lockdown period, which was another contributing factor. However, 154 responses is adequate enough based on the estimated population size.

**Table 3. 1: Krejcie and Morgan's (1970) Tool for Calculating Sample Sizes (s) for Finite Populations (N)**

<i>Total</i>	<i>Sample</i>	<i>Total</i>	<i>Sample</i>	<i>Total</i>	<i>Sample</i>
10 ⇒	10	220 ⇒	140	1200 ⇒	291
15 ⇒	14	230 ⇒	144	1300 ⇒	297
20 ⇒	19	240 ⇒	148	1400 ⇒	302
25 ⇒	24	250 ⇒	152	1500 ⇒	306
30 ⇒	28	260 ⇒	155	1600 ⇒	310
35 ⇒	32	270 ⇒	159	1700 ⇒	313
40 ⇒	36	280 ⇒	162	1800 ⇒	317
45 ⇒	40	290 ⇒	165	1900 ⇒	320
50 ⇒	44	300 ⇒	169	2000 ⇒	322
55 ⇒	48	320 ⇒	175	2200 ⇒	327
60 ⇒	52	340 ⇒	181	2400 ⇒	331
65 ⇒	56	360 ⇒	186	2600 ⇒	335
70 ⇒	59	380 ⇒	191	2800 ⇒	338
75 ⇒	63	400 ⇒	196	3000 ⇒	341
80 ⇒	66	420 ⇒	201	3500 ⇒	346
85 ⇒	70	440 ⇒	205	4000 ⇒	351
90 ⇒	73	460 ⇒	210	4500 ⇒	354
95 ⇒	76	480 ⇒	214	5000 ⇒	357
100 ⇒	80	500 ⇒	217	6000 ⇒	361
110 ⇒	86	550 ⇒	226	7000 ⇒	364
120 ⇒	92	600 ⇒	234	8000 ⇒	367
130 ⇒	97	650 ⇒	242	9000 ⇒	368
140 ⇒	103	700 ⇒	248	10000 ⇒	370
150 ⇒	108	750 ⇒	254	15000 ⇒	375
160 ⇒	113	800 ⇒	260	20000 ⇒	377
170 ⇒	118	850 ⇒	265	30000 ⇒	379
180 ⇒	123	900 ⇒	269	40000 ⇒	380
190 ⇒	127	950 ⇒	274	50000 ⇒	381
200 ⇒	132	1000 ⇒	278	75000 ⇒	382
210 ⇒	136	1100 ⇒	285	100000 ⇒	384

### 3.10. Time horizon

When conducting research, the time horizon must be addressed. According to Duliga (2018), The term "time horizon" describes the time frame over which data will be collected for a study, which may be longitudinal or cross-sectional. According to Hopwood et al. (2022), the term "time horizon" describes the time frame over which data will be collected for a study, which may be longitudinal or cross-sectional. (Wang and cheng, 2020)

Through the distribution of questionnaires to participants at the chosen schools, the cross-sectional strategy was utilized in the research to gather quantifiable data in relation to the dependent and independent variables and to identify the pattern of relationship from participants at one point in time.

### 3.11. Data analysis

The researcher used the quantification approach to convert the data to numerical form, which was then quantitatively analyzed. Coding was used to classify and identify concepts in the data in order to format it for the analytical tool chosen to analyze the data.

The research models' interdependencies were identified through the collection of data, data analysis using the Statistical Package for Social Science (SPSS), and identification of these relationships. The study included correlation and regression tests. The constructs were coded and a code book was made since the data had to be coded before being loaded into SPSS in order for SPSS to interpret and analyze the data (Arslan et al., 2020). Table 3.2 presents a breakdown of the SPSS v28 coding used to categorize the questionnaire's constructs and attributes.

**Table 3.2: constructs Coding and their attributes**

Constructs	Construct Coding	Attributes Coding
Need Change Readiness (NCR)	NCR	NCR1---NCR5
Organizational Readiness (OR)	OR	OR1---OR5
Teachers Readiness (TR)	TR	TR1---TR5
Perceived Ease of Use (PEU)	PEU	PEU1---PEU5
Perceived Usefulness (PU)	PU	PU1-PU5
Facilitating Condition (FC)	FC	FC1---FC4

### 3.12. Quality of standards

The quality of the research findings is determined by the standards of the study. The standard is divided into two parts – reliability and validity. To ensure that the conclusion produced from the data by the tool created and utilized is correct and reliable, the validity of the data acquired was checked.

### 3.13. Ethical considerations

The research proceeded through the ethical process, and an application for ethical approval was made at that time. The University, therefore, reviewed the research to ensure that the appropriate

methodology was used and to ensure that the participants were not in jeopardy throughout the data gathering procedure. Based on the following factors, the researcher's request for ethical clearance was authorized:

**Informed consent** - The purpose of the research, how perspectives would be used, where and how long the questionnaires would be kept were all explained to participants. Participants were also informed that their participation was completely voluntary, and those who opted to participate were assured that their participation would never put them or their families in risk due to the perspectives they would have stated.

**Confidentiality** - All information acquired during the survey will only be used for the goals of the study, as stated on the questionnaires. Additionally, participants received guarantees that the data they provided would be used to further the study's recommendations and would not, in turn, be used without their consent for commercial marketing or for any other reason. Participants provided anonymous responses, and the opinions expressed were in no way compromised. In order to protect the participants, the research did adhere to the managerial and ethical standards.

### **3.14. Summary**

This chapter described how the research was conducted and the methodology that was used, starting with the research design. Both the approach used in the study and the research paradigm that it embraced were discussed. The chapter went into an additional detail as regard the various data collection techniques and participant sampling procedures. The chapter covered the time zone data collection process. The chapter described the data analysis process and the technologies that were employed. The chapter concludes with a description of the methods used in the research to guarantee the accuracy of the standards and dependability tools as well as the ethical data collection methods.

## CHAPTER 4: ANALYSIS AND FINDINGS

The data and conclusions are discussed and analyzed in this chapter. The outcomes of data collection and quantitative analysis are covered in this chapter. This chapter also presents a summary of the data analysis and findings.

### 4.1. Reliability Analysis

It is crucial to conduct a study's reliability to verify that the information gathered through questionnaires is accurate and that it can be utilized to generate valid conclusions. Reliability is the capacity of a system to carry out and maintain its operations under normal and unexpected conditions (Sindhu and atangana, 2021). Reliability refers to the measuring process's capacity to be repeated, consistent, and accurate (Teixeira et al., 2021)

#### 4.1.1 Reliability of Constructs

Prior to the instrument being used to collect data, reliability and validity were ensured by examining the reliability to verify that the data would be dependable and reflect the planned and intended standard point and perspective. Additionally, a convergent and discriminant validity technique was employed to examine the notions' validity. The degree to which the same results would be reached if the research were performed at a later period by a different researcher is related to reliability and validity.

According to Wesolowski (2020), reliability is the degree to which results are consistent over time and an accurate reflection of the whole population under investigation. The research instrument is also deemed dependable if the study's findings can be replicated using a comparable approach. Boucerredj and debbache (2018) state that dependability focuses more on the precision and accuracy of a measuring tool, ensuring that the tool should provide the same findings whether used by a different researcher at a different time. When a study's dependability value is between 0.7 and 0.9, it may be very dependable (Buabeng-andoh, 2018). The SPSS Cronbach's Alpha ( $\alpha$ ), often known as the alpha coefficient, was used to test the questionnaire. The dependability of the questionnaire used to collect the data has an  $\alpha$ -coefficient of .849, which is higher than the average of 0.700, according to SPSS results. Table 4.1 displays the questionnaire's Cronbach's Alpha coefficient results:

**Table 4. 1: Questionnaire Reliability Statistics**

<b>Cronbach's Alpha</b>	<b>Cronbach's Alpha based on standardized items</b>	<b>N of items</b>
.849	.816	42

Table 4.2 displays the results of the reliability tests conducted on each of the questionnaire's constructs.

**Table 4. 2: The Reliability statistics of the a-coefficient of constructs**

<b>Construct</b>	<b>Cronbach's Alpha</b>	<b>Cronbach's Alpha based on standardized items</b>	<b>N of items</b>
Need Change Readiness (NCR)	.799	.791	5
Organizational Readiness (OR)	.740	.740	5
Teachers Readiness (TR)	.818	.851	5
Facilitating Condition (FC)	.700	.701	3
Perceived Ease of Use (PEU)	.637	.637	5
	.734	.737	4

Perceived Usefulness (PU)			
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Table 4.2 above shows that the reliability of all constructs were analyzed and are above the threshold of average 0.700.

**4.2. Participants Frequencies of the demographics and situational variables**

Teachers who work for the Department of Basic Education in Limpopo comprise the study population. Given that they are the beneficiaries from these models' convenient access to education and learning, it was assumed that the teachers would be actively or indirectly engaged in contextualizing mobile learning models when they were selected. The participants were requested to actively engage in the survey by answering questions about their experiences and perspectives.

The data gathered from the participants included their demographics, level of skill with mobile devices (smart Phone, tablet, or laptop), and knowledge of the internet. Because the study sample was selected from 6 schools, the researcher deemed it necessary to gather demographic data, including gender, age, unit, and study level, in order to ascertain if demographic and contextual factors affected instructors' preparedness for mobile learning. The results are shown in Table 4.3 below.

A closed-ended questionnaire was used to collect research data. The questionnaire contained 45 items divided into three (3) sections: Section A addressed knowledge and views of mobile learning, Section B covered factors influencing mobile learning's successful readiness, and Section C covered participant demographics. The data collected was crucial in informing and familiarizing the researcher with the various perspectives on readiness of utilizing mobile learning and non-readiness. After data collection was complete, the closed-ended questionnaire responses were coded and entered in SPSS for statistical analysis. Participant frequencies and descriptive information are provided in the table below.

The gender breakdown of the sample is shown in Table 4.3 and figure 4.1 below, with women making up 59.7% of the sample and male making up 40.3%. It is very evident that most of the participants that have mobile learning expertise in this survey are women. In addition, the age range given is 20–61+, with 47% of respondents falling in the 31–40-year-old bracket, suggesting that mobile learning is most utilized among that age group. 39% of respondents said their level of education is Bachelor/B-Tech whereas 32.5% is those have Postgraduate degrees. Moreover, 99.4% of respondents said they have smart mobile devices, whereas 89.6 said they use mobile devices several times in a day. This grants them best opportunity to be ready for the use of mobile learning. 89.0% uses the Internet daily, and 1.3% of the participants do not use it. This is a definite signal that a large number of teachers use mobile devices and Internet. In addition, 47% of respondents had decent experience with MBI, compared to 45% who have average experience and 9% who have exceptional exposure, supporting the aforementioned.

According to the findings in Table 4.3, 99.4% of participants have smart mobile devices, while 6% do not have smart mobile devices. Those who have smart phones, according to the findings, 89.6% of participants have been using smart mobile devices several times a day, while 8.4% have been using them once a day. The percentage of individuals who have used smart mobile devices once a month, once a week and those who does not use at all is less than 5% for once a month is .6% and once a week is .6%.

Participants were also asked to assess their mobile devices skills on a scale of excellent to week. Those who were excellent are 48.1%, good 39.6%, those who have average knowledge are 11.0%, 1.3% of individuals had weak Knowledge of Mobile devices,

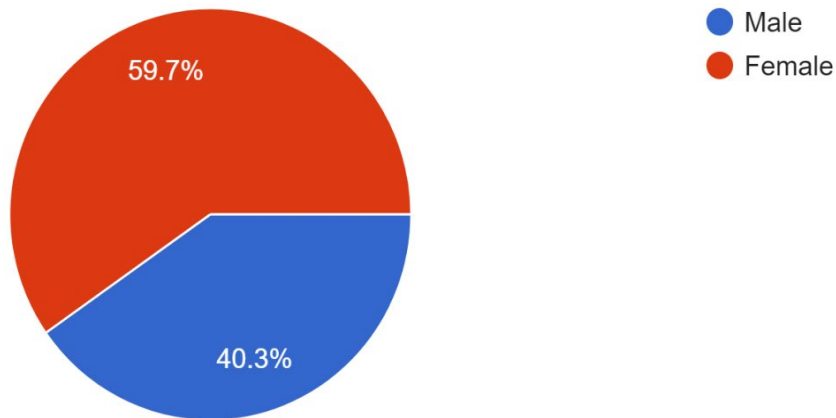
Participants also reported how frequently they used the internet. According to the findings, 89.0% of participants use the internet several times a day, while 6.5% use the internet once a day. Only a few individuals reported not using the internet regularly, as seen in Table 4.1, 3.2% of participants access the internet once a week and 1.3% do not access the internet at all.



Table 4. 3: The Frequencies statistics of participants

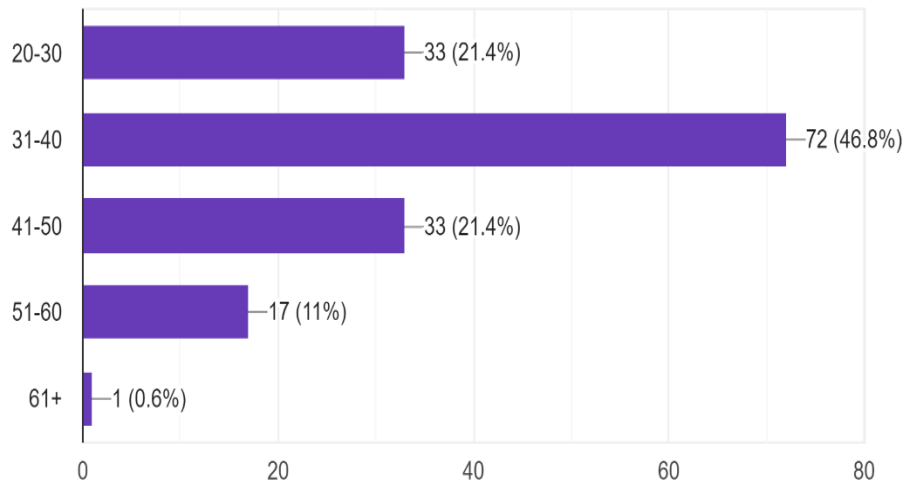
Factor	Items	Frequency	Percent	Cumulative Percent
Gender	Female	92	59.7	59.7
	Male	62	40.3	100.0
	Total	154	100.0	
Age group	61+	1	.6	.6
	51-60	16	10.4	11.0
	41-50	32	20.8	31.8
	31-40	72	46.8	78.6
	20-30	33	21.4	100.0
		154	100.0	
Level of education	Bachelor/B-Tech	60	39.0	39.0
	Certificate/High School	12	7.8	46.8
	Diploma	30	19.5	66.2
	Other please specify	2	1.3	67.5
	Postgraduate	50	32.5	100.0
	Total	154	100.0	39.0
	No	1	.6	1.3
	Yes	152	98.7	100.0
	154	154	100.0	
Working Experience	16-22 yrs	22	14.3	14.3
	23-30 yrs	12	7.8	22.1
	31 + yrs	6	3.9	26.0
	5-15 yrs	70	45.5	71.4
	Below 5	44	28.6	100.0
	Total	154	100.0	
Do you have a smart Phone, tablet or a Laptop?	No	1	.6	.6
	Yes	153	99.4	100.0
	Total	154	100.0	
Mobile Device Usage	Don't use	1	.6	.6
	Once a day	13	8.4	9.1
	Once a Month	1	.6	9.7
	Once a week	1	.6	10.4
	Several times a day	138	89.6	100.0
	Total	154	100.0	
Knowledge of using	Average	17	11.0	11.0
	Excellent	74	48.1	59.1

Mobile Device	Good	61	39.6	U
	Weak	2	1.3	100.0
	Total	154	100.0	
Knowledge of using Internet	Average	14	9.1	9.1
	Don't use	1	.6	9.7
	Excellent	83	53.9	63.6
	Good	54	35.1	98.7
	Weak	2	1.3	
Use of internet	Don't use	2	1.3	1.3
	Once a day	10	6.5	7.8
	Once a week	5	3.2	11.0
	Several times a day	137	89.0	100.0
	Total	154	100.0	
Unit	Academics	128	83.1	83.1
	Administrative	26	16.9	100.0
	Total	154	100.0	



**Figure 4.1: Gender of respondents**

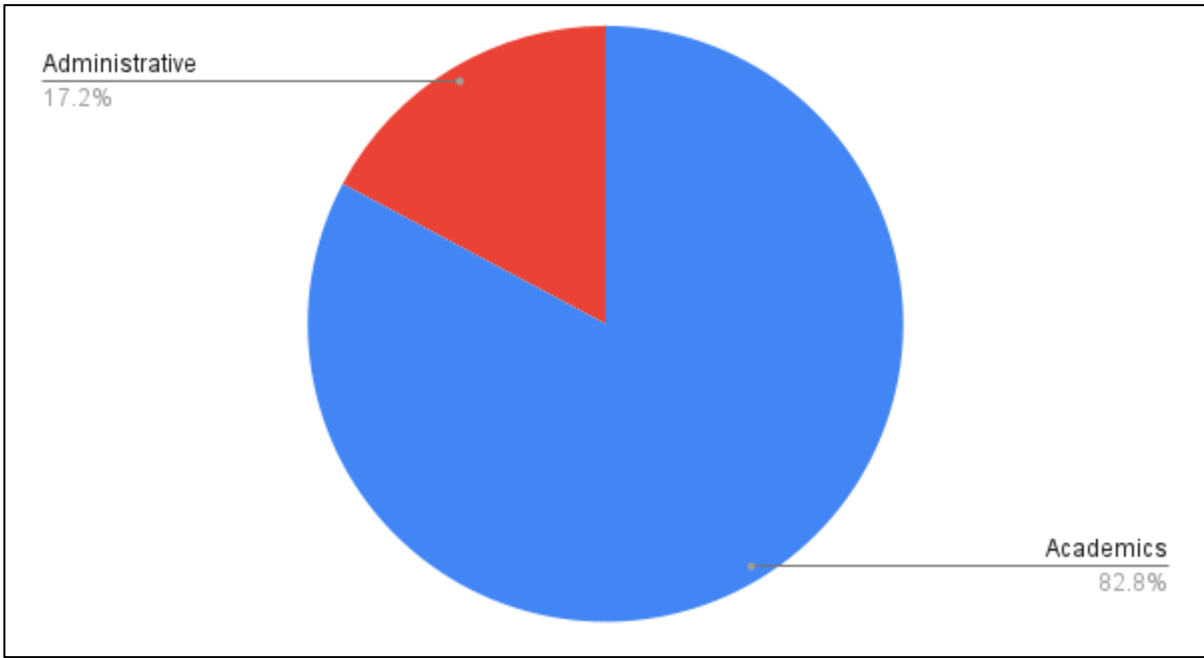
Table 4.1 demonstrates that there was a gender balance in participation, with 59.7% of participants being female and 40.3% being male. The research included both male and female teachers. Based on the total number of participants from all schools, this classification is based on gender.



**Figure 4. 2: Age of respondents**

The statistics in Figure 4.2 indicate that the age group with the greatest participation percentage was the 31-40 age group, with a rate of 46.8%. Both age group 20-30 and 41-50 had a 21.4% participation rate, the 51-60 age range, as well as those who are 60+, had participation rates of less than 12%. The age range 51-60 had a 11% participation rate, while those beyond 50 had a 0.6% participation rate.

According to the chart below (Figure 4.3), the respondents were from Administrative and Academic units within the department. Academic had a larger proportion of respondents (82.8%), whereas Administrative had just 17.2% of participants.



**Figure 4. 3: Units of respondents**

Participants were also asked to specify their level of education (certificate, diploma, Bachelor/B-Tech, or postgraduate). According to the results, 39.0% of the teachers who participated have Bachelor/B-Tech degree, 32.5% have their Postgraduate qualification, 19.5% have Diploma, and 7.8% have Certificate/High School qualification. Only 1.3% specified their qualifications as other. As indicated in Figure 4.4.

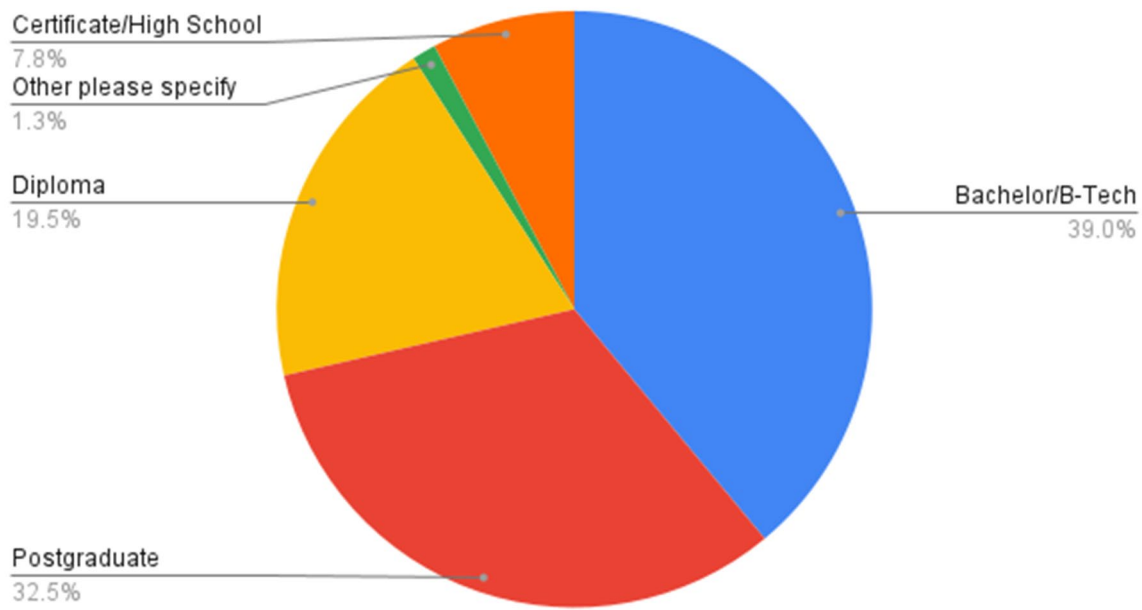


Figure 4. 4: Educational Level

### 4.3 Situational Variables

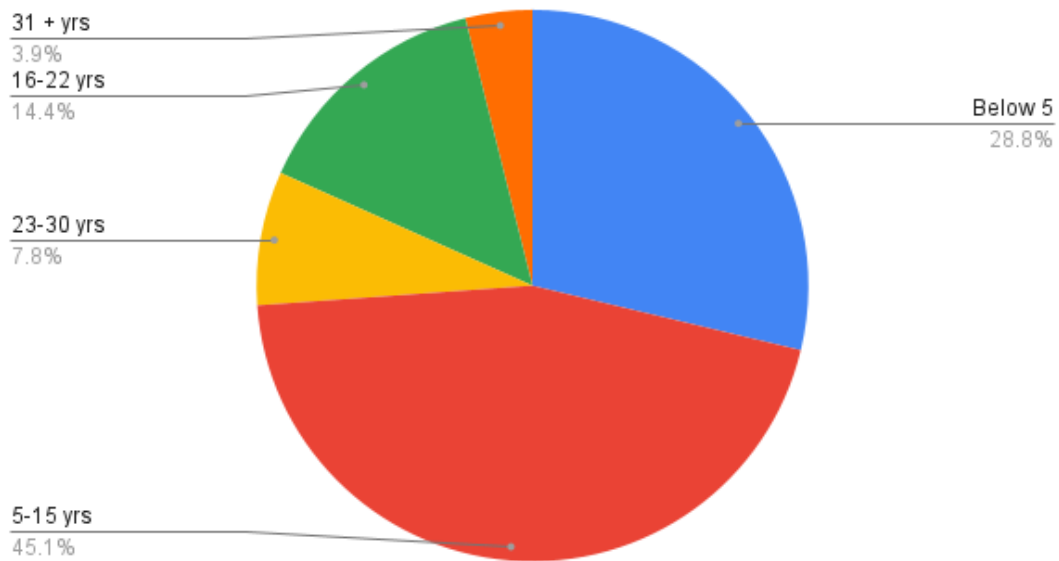


Figure 4. 5: Years of Experience of respondents

The study of job knowledge and work experience was done to determine the situational variable. According to Figure 4.5 and 4.3, and Table 4.3 above, most responses (82.8% of participants) were from employees at the academic level. Furthermore, 17.2% of

Administrative staff at the schools who are referred to assistance teachers reported using mobile device for mobile learning purposes. This suggests that most mobile learning users are at the Academic unit.

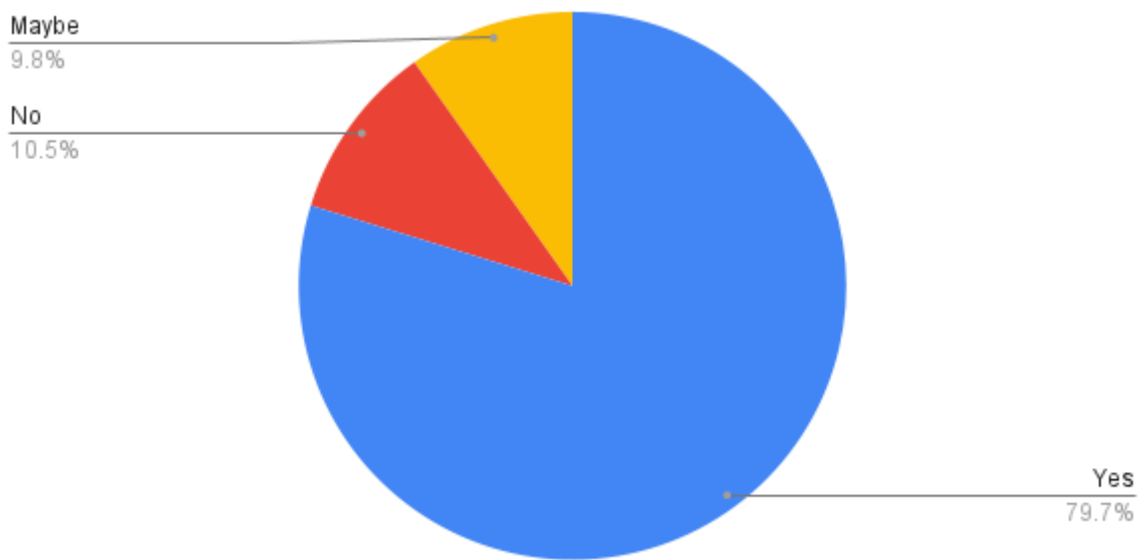


Figure 4. 6: Use mobile applications for teaching and learning purposes

The figure 4.6 above illustrates that 79.7% of teachers use mobile applications for teaching and learning purposes whereas 9.8% are not sure whether the applications they use are for teaching and learning purposes.

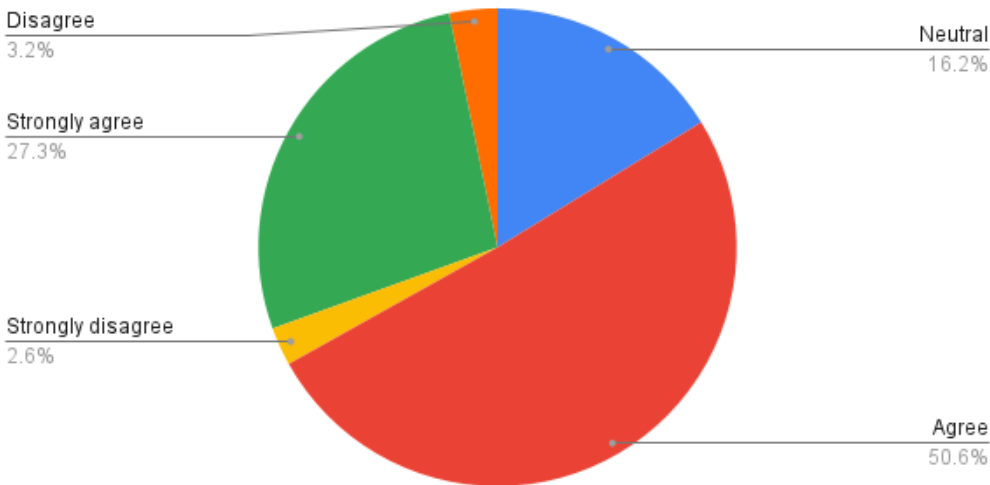
**Table 4. 4: Mobile applications tool utilization frequency**

		Frequency	Percent	Cumulative Percent
Valid	Email	17	11.0	11.0

Facebook Messenger	5	3.2	14.3
Google chat	1	0.6	14.9
Utube	14	9.1	24.0
WhatsApp	103	66.9	90.9
Zoom	14	9.1	100.0
Total	154	100.0	

The study gathered information on a variety of mobile learning applications that may be used for academic objectives, that is Facebook messenger, WhatsApp, Utube, Zoom, Google chat and Email. The participants were asked to mention the applications they use for mobile learning and the responses are illustrated in Table 4.4 which reveals that the majority of the teachers use WhatsApp mobile application for teaching and learning purposes. According to the statistics, the WhatsApp is frequently used, with a usage rate of 66.9%, showing that most teachers at the department of basic education use it frequently, followed by Emails with a usage rate of 11.0%. Statistics also show that zoom and Utube are underutilized, both with 9.1% usage rate each. Only 3.2% of teachers said they utilize Facebook Messenger, and 0.6% use Google chat.

Participants were also asked if there are network issues that may affect the use of mobile learning applications. According to Figure 4.7, 50.6% of respondents agreed that they encounter the network coverage issues.



**Figure 4. 6 Network issues**

## 4.2 Descriptive analysis

This portion of the chapter contained a descriptive study of the constructs. The questionnaire mostly employed closed-ended questions with all potential responses or pre-written response categories, and respondents were required to choose just one of them. The questionnaire was developed on a five-point Likert scale, with 1 being strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. The constructs of the framework in chapter two, Figure 2.7, produced the questionnaire sections. Each construct was thoroughly analyzed to verify that questionnaires were produced in line with the research goal. Furthermore, the attributes of these constructs were used to develop the survey questionnaires. The parts of the questionnaire were based on the constructions of the framework in chapter two Figure 2.7. To make sure that questionnaires are created in accordance with the goal of the study, each construct was thoroughly examined. The questionnaire items were also created using these structures' properties.

The constructs' minimum, maximum, mean, and standard deviation were constructed as shown in Table 4.5 below.

**Table 4. 5: Descriptive Statistics of constructs**

<b>Descriptive Statistics</b>					
	N	Minimum	Maximum	Mean	Std. Deviation
NCR	154	1.6	5.0	3.544	.8760
ORGR	154	1.00	5.00	3.6169	.93085
TR	154	1.50	5.50	4.0260	1.03972
PEU	154	1.60	5.00	3.5834	.96189
PU	154	1.50	5.00	3.4935	.99712
FC	154	1.50	5.00	3.4930	1.05181
TMLR	154	1.86	5.08	3.6260	.71285
Valid (listwise)	N 154				



The results demonstrate that the mean of all constructs was more than 3, indicating that respondents were essentially split between Neutral and strongly agree. Table 4.5 reveals that FC (Facilitation Condition) has the largest standard deviation, indicating that mobile learning is extremely likely to be a success and that most participants are interested and ready to use mobile learning. The descriptive statistics of the constructs described above demonstrate that the TR (Teachers Readiness) has a highest mean score of 4.02, implying that most respondents agree with the research's goal and they are ready to use mobile learning. The (OR) Organisational Readiness has the high mean of 3.6169, which implies that the organization is also ready to support teachers' use of mobile learning. The lowest mean is (FC) Facilitation Condition with the mean of 3.4930.

#### 4.4 Correlations of Constructs

The correlation coefficient, which ranges in value from (-1.00) to (+1.00), reveals how closely the two variables are related. The link between the variables is said to be direct when the value is positive, which occurs when both variables increase at the same time. The connection is said to be inversed when the value is negative, meaning that one variable decline while the other increases. According to Senthilnathan (2019) the correlation coefficient is zero when there is no connection between the variables, while correlations more than 0.80 are deemed strong. The sign denotes the relationship's direction.

**Table 4. 6: Correlations of the constructs**

<b>Correlations</b>		NCR	ORGR	PEU	FC	PU	TR
NCR	Pearson Correlation	1					
	Sig. (2-tailed)						
	N	154					
ORGR	Pearson Correlation	.548**	1				
	Sig. (2-tailed)	<.001					
	N	154	154				
PEU	Pearson Correlation	.398**	.336**	1			
	Sig. (2-tailed)	<.001	<.001				

	N	154	154	154			
FC	Pearson Correlation	.392**	.370**	.539**	1		
	Sig. (2-tailed)	<.001	<.001	<.001			
	N	154	154	154	154		
PU	Pearson Correlation	.451**	.371**	.451**	.544**	1	
	Sig. (2-tailed)	<.001	<.001	<.001	<.001		
	N	154	154	154	154	154	
TR	Pearson Correlation	.427**	.449**	.375**	.465**	.459**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	
	N	154	154	154	154	154	154

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

Most correlations between the constructs are significant at 0.01 according to Table 4.6 above. The Pearson correlation between Need Change Readiness (NCR) and organizational Readiness (ORGR) is 0.548. Facilitation condition (FC) is, nevertheless, significant to both PU (Perceived usefulness) and ORGR (Organizational Readiness), with Pearson correlations of 0.392 and 0.370, respectively. The highest significance of 0.575 is found between TR and PEU. Nonetheless, all structures are significant merely because they are related to one another.

#### 4.5 Regression Analysis

Multiple regression analysis was used to determine interdependency between constructs because of correlations. The analysis reveals the importance of the dependent-independent connection. The model demonstrates how independent and dependent variables affect each other.

##### 4.5.1. Model Summary

The significance of the relationship between the dependent variable (TMLR) and the independent factors is depicted in Table 4.7 below (NCR, ORGR, TR, PEU, PU and FC). The results of the study indicate that R square is 0.904, suggesting that all independent factors are serving as mediating dependent variables (TMLR). The summary of the proposed model, with an R-square value of 9.04%, is provided.

**Table 4. 7: Model Summary**

<b>Model Summary</b>									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.951 <sup>a</sup>	.904	.902	.21307	.904	351.450	4	149	<.001
a. Predictors: (Constant), NCR, ORGR, TR, PEU, PU, FC									

According to Table 4.7, the entire linear model's forecast of the developed mobile learning readiness model's contribution to South African rural high schools is 90.4%, with a R Square of 0.904. According to the findings, the model is sufficiently reliable to be used in the development of a mobile learning readiness model for South African high schools in the rural areas of Limpopo.

The Anova shown in Table 4.8 below provides evidence for the model's general relevance and details its degrees of freedom. This model is statistically significant with a p-value of 0.001 and 147 degrees of freedom.

**Table 4. 8 Anova**

<b>ANOVA<sup>a</sup></b>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	130.596	6	21.766	18.714	<.001 <sup>b</sup>
	Residual	170.969	147	1.163		
	Total	301.565	153			
a. Dependent Variable: TMLR						
b. Predictors: (Constant), NCR, ORGR, TR, PEU, PU, FC						

**Table 4. 9 Coefficients of independent constructs**

<b>Coefficients</b>
---------------------

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.715	.301		2.378	.019		
	ORG	.345	.080	.367	4.963	.002	.743	1.345
	TR	.139	.083	.131	1.686	.094	.670	1.492
	PEU	.112	.073	.123	1.541	.125	.637	1.570
	FC	.025	.071	.030	.350	.727	.556	1.799
	PU	.169	.084	.173	2.014	.068	.551	1.815
a. Dependent Variable: TMLR								

Table 4.9 above displays the model's multiple regression results and variance inflation factor (VIF). The result of 4.963 for Organizational Readiness (ORG) indicates that it is the construct with the highest support. The research shows that all variance inflation factor values are within the range of VIF 10, which is considered acceptable. Organizational Readiness Construct had the strongest correlation, at .367. The findings, however, also demonstrated that multicollinearity does not exist since all values were below the cutoff of <10.

Values with a P value of <0.05 or below were those of Facilitating Condition (FC), Perceived Ease of Usefulness and Perceived Usefulness (PU) which were significant to Deployment of Teachers' Mobile Learning Readiness (TMLR), whereas Teachers' Readiness (TR) is insignificant to TMLR as its value is higher than 0.05 at  $P > 0.05$ . However, the implementation of TMLR based on strong mediating variables of Need Change Readiness (NCR), Organizational Readiness (ORG) and Facilitating Condition (FC).

#### 4.6 Hypothesis Testing

Confirmatory analysis results from Chi-square were produced using cross tabulation to determine whether the hypothesized relationship exists between the dependent variable (MLR) and the

independent variables (NCR1---NCR5, ORGR1---ORG5, TR1---TR5, PEU1---PEU5 and FC1-FC4).

**Table 4. 10: Case Processing Summary**

<b>Case Processing Summary</b>						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
TMLR * NCR1---NCR5	154	100.0%	0	0.0%	154	100.0%
TMLR * ORGR1---ORG5	154	100.0%	0	0.0%	154	100.0%
TMLR * TR1---TR5	154	100.0%	0	0.0%	154	100.0%
TMLR * PEU1---PEU5	154	100.0%	0	0.0%	154	100.0%
TMLR * PU1---PU5	154	100.0%	0	0.0%	154	100.0%
TMLR * FC1-FC4	154	100.0%	0	0.0%	154	100.0%

Need Change Readiness (NCR1-NCR5), Organizational Readiness (ORGR-ORG5), Teachers readiness (TR1-TR5), Perceived Ease of Use (PEU1-PEU5), Perceived Usefulness (PU1-PU5), and Facilitating Condition (FC1-FC4) as mediating variables and independent variables are crossed-tabbed Conceptualized Teachers' Capability for Mobile Learning, as Depicted in Table 4.10 above.

**Table 4. 11: TMLR \* NCR NCR1---NCR5 test**

<b>Table 4.11: TMLR * NCR NCR1---NCR5 test</b>			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	189.195 <sup>a</sup>	72	<.001
Likelihood Ratio	161.398	72	<.001

Linear-by-Linear Association	65.034	1	<.001
N of Valid Cases	154		
a. 86 cells (90.5%) have expected count less than 5. The minimum expected count is .03.			

Table 4.11 illustrates that the statistics value of chi-square for Need Change Readiness and developed TMLR is 189.195<sup>a</sup> with 72 degrees of freedom (df). This means that 72 independent data pieces showed a statistical value of 189.195<sup>a</sup> P-value, which measures significance, is <0.001, which is less than the necessary threshold of 0.05. This implies the proposed significance of the relationship between NCR1-NCR5 and TMLR.

**Table 4. 12: TMLR \* ORGR ORGR1---ORG5 Chi-Square Tests**

<b>TMLR * ORGR ORGR1---ORG5 Chi-Square Tests</b>			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	146.203 <sup>a</sup>	84	<.001
Likelihood Ratio	96.584	84	.164
Linear-by-Linear Association	19.050	1	<.001
N of Valid Cases	154		
a. 102 cells (92.7%) have expected count less than 5. The minimum expected count is .03.			

Organizational Readiness (**ORGR1-ORG5**) and TMLR in Table 4.12 above, the chi-square test returns a statistic value of 146.203<sup>a</sup> with 84 degrees of freedom (df) at p=0.001 <0.05. This further demonstrates the importance of the relationship between organizational readiness (ORGR1–ORG5) and TMLR.

**Table 4. 13: TMLR and TR1-TR5 Chi-Square Tests**

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	75.952 <sup>a</sup>	60	.002
Likelihood Ratio	74.970	60	.092
Linear-by-Linear Association	14.148	1	<.001

N of Valid Cases	154		
a. 73 cells (91.3%) have expected count less than 5. The minimum expected count is .03.			

The Chi-square statistics value for teachers' readiness and TMLR is 75.952a with 60 degrees of freedom at .002, which is less than the necessary standard value of 0.05 (as shown in Table 4.13). This suggests that the theory is true and that there is a significant relationship between TMLR and TR (TR1-TR5).

**Table 4. 14: TMLR \* PEU PEU1---PEU5**

<b>Chi-Square Tests</b>			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	113.889 <sup>a</sup>	72	.001
Likelihood Ratio	92.425	72	.053
Linear-by-Linear Association	8.336	1	.004
N of Valid Cases	154		
a. 85 cells (89.5%) have expected count less than 5. The minimum expected count is .03.			

Perceived Ease of Use (TMLR \* PEU1-PEU5) according to Table 4.14, has a statistical value of 113.889a, 72 degrees of freedom, and a 0.053 p-value. The recommended hypothesis is accepted since the output significance (P-value) in this example is .001, which is lower than the necessary value of 0.05. This indicates that there is a significant link between PEU1-PEU5 and TMLR.

**Table 4.15: TMLR and PU1---PU5 Chi-Square Tests**

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	63.633 <sup>a</sup>	68	.001

Likelihood Ratio	63.403	68	.635
Linear-by-Linear Association	16.312	1	<.001
N of Valid Cases	154		
a. 81 cells (90.0%) have expected count less than 5. The minimum expected count is .03.			

Perceived Usefulness (PU1-PU5) and TMLR presented in Table 4.15 above displays statistics value of 63.633a with 68 degrees of freedom (df) at  $p=0.001 < 0.05$  for the chi-square test. The results entail that 68 independent variable factors presented a 63.633a of value statistically between TMLR and PU1-PU5. This also indicates that the relationship between Perceived Usefulness (PU1-PU5) is insignificant, and the hypothesis is accepted.

**Table 4. 15: TMLR \* FC FC1-FC4**

<b>Chi-Square Tests</b>			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	87.079 <sup>a</sup>	68	.059
Likelihood Ratio	74.212	68	.283
Linear-by-Linear Association	6.492	1	.011
N of Valid Cases	154		
a. 82 cells (91.1%) have expected count less than 5. The minimum expected count is .03.			

Table 4.16 shows that statistics value of chi-square for Facilitating Condition and TMLR (TMLR \* FC FC1-FC4) is 87.079a with 68 degrees of freedom (df). It means that a statistical value of 87.079a between the developed TMLR and FC1—FC4 was revealed by about 68 independent data factors. The P-value, which measures significance, is .059, which is higher than the necessary threshold of 0.05. This suggests that the proposed relationship between developed TMLR and FC1-FC4 is rejected.

Hypothesis testing was done to illustrate the importance of the hypothesis relationship and whether it is accepted or not, as stated in Table 4.17 below. This was done to ascertain if the constructs of the research model vary from one another, whether one construct predicts the



other, whether the offered solutions have effects, and whether the recommended effects mainly differ from each other.

**Table 4. 16: Hypothesis testing interpretation**

<b>Construct</b>	<b>Hypothesis</b>	<b>Significant value (P-value)</b>	<b>Comment</b>
Need Change Readiness (NCR)	<b>H1:</b> Need Change Readiness (NCR1) will influence Mobile learning readiness	$P = 0.001 < 0.05$	Accepted
Organizational Readiness (ORGR)	<b>H2:</b> Organizational Readiness will influence Mobile learning readiness	$P = 0.001 < 0.05$	Accepted
Teachers readiness (TR)	<b>H3:</b> Teachers readiness (TR1) will influence Mobile learning readiness	$P = 0.002 < 0.05$	Accepted
Perceived Ease of Use (PEU)	<b>H4:</b> Perceived Ease of Use (PEU) will influence Mobile learning readiness	$P = 0.001 < 0.05$	Accepted
Perceived Usefulness (PU)	<b>H5:</b> Perceived Usefulness (PU) will influence Mobile learning readiness	$P = 0.001 < 0.05$	Accepted
Facilitating Condition (FC)	<b>H6:</b> Facilitating Condition (FC1) will influence Mobile learning readiness	$P = 0.059 > 0.05$	Rejected

#### 4.7 Summary

The research results were provided in this chapter. The discussion of participant demographics and frequency was followed by a review of the descriptive statistics for the constructs and variable correlation to show the reliability of the relationships. The chapter also presented the results of multiple regressions and discussed the findings of bivariate analyses that demonstrated how each construct scored in relation to its measured items. The discussion of Chi-square analysis and reporting was concluded with the discussion of the interpretations and results of hypothesis testing.



## **CHAPTER 5: DISCUSSION, INTERPRETATION OF THE RESULTS, EVALUATION AND CONCLUSION**

This chapter is divided into three sections: an overview of the study, a discussion and interpretation of the findings, and a recommendation for further research. The "Overview" section provides an overview of each chapter, from the first to the fifth. The section on discussion and interpretation of the results discusses how the study findings relate to the research goals and objectives, the theoretical frameworks used to develop the study's hypotheses, the study's limitations, and how it contributes to the body of knowledge in the field of ICT. The study's recommendations for further research and findings are included in the last section.

### **5.1. Overview of the study**

The chapter discusses the study's topics in logical sequence, from chapter one to chapter five.

#### **Chapter One: Introduction and background**

This chapter covered the introduction to the research, which also gave some context for the topic. The problem statement that prompted the researcher to do research in the field of mobile learning readiness were also explained in this chapter. The study aims and objectives, as well as the research questions that emerged from the goals, were also covered in this chapter. Based on the goals of the study, the chapter highlighted the value of the research and how it added to the body of knowledge in the field of mobile learning.

#### **Chapter Two: Mobile learning readiness and related frameworks and model for the study**

The chapter reviewed the literature that was related to this study. The chapter also focused on the framework and models that were found to be helpful in creating a research model for this study. The research model, defined as Teachers' Mobile Learning Readiness Model (TMLR), was developed using the Technology Acceptance Model (TAM) and the Technology Readiness Index (TRI). The studies that have been conducted and the literature that has been reviewed have shown that these theoretical frameworks are the most relevant and most suitable to use to assess changes, implementation, utilization, and effectiveness of a newly introduced product or system

in the field of ICT. In addition to reviewing the relevant theories for the study, discussions of the theoretical frameworks utilized in previous studies resulted in the construction of a conceptual framework that served as the guide for this study. The chapter was wrapped up with a discussion about and developing the research model's hypotheses.

### **Chapter Three: Research methodology**

This chapter covered the methodology of the study, including the approach used, the research paradigm chosen, and the strategy used. It also included the research design, which describes how the investigation was done. The chapter described the various data collection techniques that were used as well as how participants were selected. The chapter explained the method used to determine the time zone for data collection. The research's quality standards and reliability, in addition to how it was managed in terms of ethics throughout data collecting and the whole study, were all covered in the last section of this chapter.

### **Chapter four- Data analysis**

The data analysis method was described in the chapter. The analysis comprised participant frequency and demographics, and correlation and regression tests to validate the significance and insignificance of the relationship between the dependent and independent components chosen for the research. Subsequently, the hypotheses were analyzed to decide which proposed hypotheses were accepted and which were rejected based on the necessary criteria. Participants' demographics, as well as correlation and regression tests, were utilized to assess the significance of the relationship between the constructs chosen for the research. Finally, the hypotheses were tested in sequential manner.

### **Chapter Five - Discussion and conclusion**

This chapter discusses the study findings in depth based on the results of the data analysis in Chapter Four, and presents conclusions and recommendations based on the findings. The study's limitations and contributions to the area of ICT are also covered in the chapter. The chapter also outlines the objectives and areas of research that set the course goal for the research.

## **5.2. Discussions and interpretation of the findings**

The main goal of this research was to assess the teachers mobile learning readiness in Limpopo department of basic education schools.

The study objectives were to:

- I. Identify the factors that influence the mobile learning readiness
- II. Determine the influence of the identified factors of mobile learning readiness in South African rural high schools.
- III. Utilize the identified factors in developing a Teachers' mobile learning readiness assessment model for South African rural high schools.

### **5.2.1. Research objective one**

**Identify the factors that influence the mobile learning readiness in South African rural high school.**

In chapter two of the study, a review of the literature was done with the goal of identifying the factors influencing readiness of teachers towards mobile learning for South African High schools of Limpopo basic education. From the existing literature, six characteristics were found to influence the readiness of mobile learning in the South African schools. The following factors were identified:

- I. Need Change Readiness
- II. Organizational Readiness
- III. Teachers' readiness
- IV. Perceived Ease of Use
- V. Perceived Usefulness
- VI. Facilitating Condition

In chapter two of this study, it was identified that the factors contributing to readiness assessment could be classified into six categories. These were the readiness categories; need change

readiness, organizational readiness, teachers' readiness, perceived ease of use, perceived usefulness and facilitating conditions. Figure 2.3 illustrates a structural arrangement in which components of each construct were discovered. Five variables were defined for the need change readiness construct, five for organizational readiness construct, and five for teachers' readiness and Perceived ease of use, five for perceived usefulness, and four variables for facilitating factors.

As a result, this goal was addressed by identifying the factors, as well as the variables within them, that influence teachers' mobile learning readiness. Establishing these variables can assist in assessing their readiness for mobile learning.

### **5.2.2. Research objective two**

Determine the influence of the identified factors to the teachers' readiness of mobile learning readiness in South African rural high school.

In chapter two (2) the related literature analyzed for this study; previous research concluded countless recommendations. Using the factors for Research Objective 1, hypotheses were developed and tested. To evaluate each factor's significance to the research, hypotheses were created for every factor and tested. As indicated in Table 4.17, only five of the six factors were determined to be significant, and they were accepted as explained below:

#### **I. Need Change Readiness**

The first hypothesis (H1) of the study predicted that there would be a positive relation between need change readiness and mobile learning readiness.

H1: Need change readiness will influence the mobile learning readiness of South African rural high schools.

It was determined that this hypothesis was correct and was supported. The construct was found to be significant with a value of  $<.001$ , which is  $<0.05$ , showing that the construct has a positive influence on an organization's readiness for mobile learning. As a result, the hypothesis was accepted.

If mobile learning is to be effectively implemented, then teachers in the Organization (the department of basic education and schools within), regardless of the size, need to be open to change. This is the result of what has been stated here. It has been proven by academics (for example, Cameron and green (2019);Alqatawenah (2018)) that change management is an essential component for every IT innovation implemented within an organization. It is of the utmost importance that any change be managed in such a way that the impact it has on the organization and its employees, which may include teachers and other employees in the case of a school, is minimized (Rosenbaum et al., 2018). Teachers' dissatisfaction with the existing learning system as a result of its lack of availability, accessibility, and dependability may be a positive factor which may lead to the teachers' readiness for new technologies. Awareness might lead to underutilization of the existing learning system and the capacity to acquire knowledge via various forms of technological apparatus.

For effective management of change, preparation of teachers in the form of training, sensitization, and engagement may be required (Al-hunaiyyan et al., 2018). The most common misunderstanding regarding mobile learning is the idea that everything will work out accurately because there would be little to no substantial internet maintenance. The organization may look at mobile learning from the financial perspective and conclude that it is cost efficient. However, they do not take into consideration the organization implications that are linked with the model, which gives birth to a misconception. According to the findings of researchers Al-hunaiyyan et al. (2018); and Lim et al. (2019), there will be some impact regardless, and it is imperative that this influence be handled.

Researchers in the field of IT innovations such as Kumar and chand (2019); Sattarov and khaitova (2020); El-sofany and el-hagggar (2020) came to the conclusion that the deployment of a new system might be complicated by a number of issues. The technological, economic, and cultural elements are some examples of such factors that have been widely identified. A favorable or unfavorable assessment of the invention may result from the interaction of several elements. Internal opposition might be caused, for instance, by cultural concerns (Kearney et al., 2020). The move to the mobile learning, on the other hand, will trigger a transition from classroom-based teaching to learning anytime and anyplace, which may drive a significant transformation in the IT departments and governance within the Organization. Additionally, the migration will cause a shift

in the technical management of an organization since it will force an organization to embrace and depend on the mobile technologies. All these things, if they are not adequately controlled, might result in significant difficulties with the implementation of mobile learning. If these elements connected with transformative change are not addressed, it is possible that even the most effective mobile strategies and technologies offered by the most reputable suppliers would fail. Therefore, need change readiness management does have a role, which is why H1 was found to have a favorable result, meaning that a significant number of respondents took into consideration these factors.

## II. Organizational Readiness

The organizational readiness was the focus of the second hypothesis (H2), which has been accepted.

**H2:** Organizational readiness will influence mobile learning readiness in South African rural high schools.

The construct was found to be significant with a value of  $<.001$ , which is  $<0.05$ , as a value of  $0.05$  signifies that the construct has an impact on the readiness for mobile learning in rural high schools in South Africa.

Organizational readiness develops advantages associated with organizational structures. These might include current ICT policies and laws. Organizational culture and strong work ethic, as well as the availability of resources (Almaiah and al mulhem, 2019).

In today's world, the educational organization or the department of basic education increasingly relies heavily on IT operations to carry out their day-to-day operations. Schools all around the world are dependent on information to ensure the smooth operation of their teaching and learning (Muhammet and okan, 2018). If a system is not accessible, operations may be hampered or entirely halted across a few departments within the organization. As a result, organizational readiness is an essential prerequisite for mobile learning readiness. Mobile learning cannot be successful without a well-designed mobile environment; otherwise, the mobile learning project will fail (Narang, 2022).



In any event, the organizational availability within the department responsible for the implementation becomes a significant factor. These results are in line with those of other researchers who underlined the importance of organizational readiness to the success of IT innovations (Pumplun et al., 2019). This suggests that fundamental factors, such as network and internet, ought to be operational before embarking on mobile learning initiatives. The conclusions of this study are also consistent with the findings of Wei and li (2021) who stated that users should have adequate expertise or training on the system to be utilized before using it.

People may be reluctant to implement a new system if they believe it would make it more difficult to carry out their day-to-day activities because of internal cultures and interest groups. Considering these data, the expected association between organizational readiness and perceived ease of use may also be explained.

### III. Teachers' Readiness

The third hypothesis (H3) anticipated that there would be a positive link between teacher readiness and mobile learning readiness. This hypothesis was accepted.

**H3:** Teachers' readiness will have positive influence on mobile learning readiness in SA rural high schools.

The hypothesis was accepted since the construct was found to be significant. The value of 0.002 which is  $< 0.05$  indicates that the construct has a favorable impact on teachers' readiness for mobile learning in rural high schools in South Africa.

The findings of this study suggest that, even though the advantages of mobile learning have received a great attention in recent years, a significant number of schools continue to have disbelief over the possibility of transitioning to this type of teaching and learning. These findings are in line with what Sungur-gül and ateş (2021), Insorio (2021), and (Christensen and knezek, 2018) have found out that the variables influencing individuals' readiness to new IT advancements are numerous. In the context of mobile learning, these considerations may include, but are not limited to, a simple dislike to change, concerns about privacy and data protection, and reluctance to adapt to new rules and regulations. Additional concerns that are particularly related to mobile

learning might include insufficient understanding of what mobile learning is which leaves open the question of what the exact fundamental difference is between mobile learning and classroom-based learning.

Such Uncertainty will be a contributing factor in the speed at which teachers will implement mobile learning. Most educational organizations adhere to strict guidelines and regulations. This presents a difficulty. The question that remains is, if there is intense opposition among providers for mobile learning space, should the policies and standards that have been established by the organization be adhered to? This ends up being a key factor. The issue of the norms and standards of mobile learning presents still another significant challenge. Concern regarding privacy and safety may arise. Because of this, there will be questions raised as educational organizations are concerned.

According to the findings of Akour et al. (2021), many people have fear, which is in keeping with their findings. Organizations just jump on the movement of IT without doing any thorough planning, which leaves them lost. However, the COVID-19 pandemic uncertainties, made teachers and the organization to realize the potential and benefits that mobile technology may give to teachers and learners while they were attempting to teach and learn at unexpected times (Akour et al., 2021). This led to positive response towards teacher's readiness for mobile learning.

The overall conclusion of these findings is that educational organization and teachers ought to work toward implementing mobile learning to a reasonable degree. They need to have a business plan for mobile learning that is in line with the long-term goal considering uncertainties that may rise in the years to come. Additionally, this must be clear with the financial and strategy objectives of the organization, which together comprise an appropriate risk management background. On the other side, the organization should establish a governance rule. These standards should contain security criteria, facilitate uniformity and logical mobile learning implementation, and avoid the development of random, uncoordinated activities throughout the schools.

#### IV. Perceived Ease of Use

H4: Perceived ease of use will significantly influence mobile learning readiness. This hypothesis was accepted.

According to the findings of this research, the phenomena known as perceived ease of use, which is identical with effort expectancy (Paledi and alexander (2018) or complexity (Mogase and alexander (2018), can be rather inflexible.

The hypothesis was found to be significant and to have value, therefore the hypothesis was accepted with  $.001 < 0.05$  as a value  $< 0.05$  which shows that the construct influences on the mobile learning readiness.

The advantages of Mobile learning have received a lot of attention but realizing that these advantages will also fully depend on the organizational setting in which the mobile learning is implemented as well as the model that is selected. The SWOT analysis results enable researchers to discover the strengths, weaknesses, opportunities, and threats associated with the use of mobile devices (Adeyelure et al., 2019). The idea that using mobile learning is simple and intuitive will be influenced by factors such as teachers training, personal preferences, and capability, despite the fact that concerns over availability and security take up more of the spotlight. If teacher training is not provided during the first stages, teachers, especially those with poor backgrounds or who lack IT skills, will find mobile learning challenging to utilize. This is especially true for users with a weak background in IT.

On the other hand, the implementation of mobile learning makes it possible for teachers to access teaching materials and applications in a straightforward and nearly immediate manner. The context of mobile learning might be accessible from nearly any location that has connection to the internet (Sekhaolelo et al., 2018). Because of this versatility, teachers may get the impression that mobile learning is simple to use. When seen from these advantage points, mobile learning becomes easier to understand. Because of this, the results of this study proved the significance for the perceived ease of use construct.

## V. Perceived Usefulness

H5: Perceived usefulness will significantly influence mobile learning readiness.

Due to the construct's significance and value of  $.001 < 0.05$ , a value  $< 0.05$  which shows that the construct influences on the mobile learning readiness, this hypothesis was accepted.

Perceived usefulness refers to how significantly using mobile learning applications will improve teacher engagement and spread the idea of smart learning. Users' estimations of the value of mobile learning applications are based on the benefits they experience from using them (Maphosa, 2020). A significant number of skilled IT specialists in the department of basic education will examine an innovation in information technology from the standpoint of finance, with the expectation that the innovation would result in cost savings and a reduction in losses. Their thinking is that teachers will become more productive and efficient once the mobile learning platform is put into place. Nevertheless, Almasri (2018) advised that Perceived Ease of Use and Perceived Usefulness are the important determinants for an individual's readiness, acceptance and usage on mobile learning.

## VI. Facilitating Conditions

H6: Facilitating Condition (FC1) will influence Mobile learning readiness

Hypothesis (H6) suggested a positive influence between facilitating conditions with Mobile learning readiness. The construct was determined to be insignificant with a value of  $P = 0.059 > 0.05$ , as a value  $>0.05$  which specifies that the hypothesis has a negative influence on Mobile learning readiness.

Several studies have demonstrated the importance of facilitating conditions. In order to provide adequate training and support, facilitating conditions must be considered (Hamzah et al., 2020).

The degree to which a person believes that the existing organizational and technical infrastructure can support the use of technology is referred to as facilitating conditions. The findings of this study are consistent with those of Alasmari and zhang (2019) who mentioned that facilitating conditions and other infrastructure significantly influenced the use of mobile learning technology in, Saudi Arabia and Pakistan.

Organizations should offer support from the planning stages through the post-implementation stages of any IT innovation. For the success of an IT innovation, (Skoumpopoulou et al. (2018)) advised that enterprises give training, sensitization, and guidance to users. The importance of

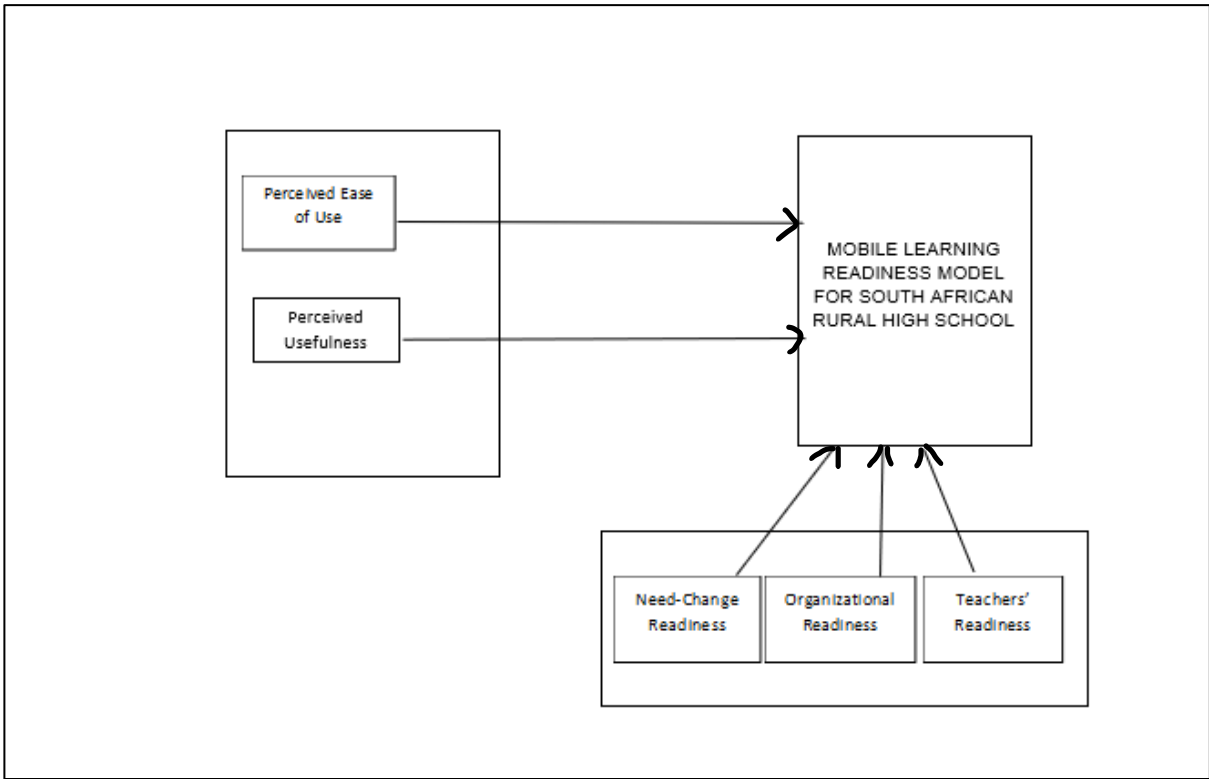
security measures, effective strategies and policies, and enhancing the reliability as well as authenticity of information have all been emphasized by organizations. Users of mobile learning will anticipate their organizations putting these practices into place to ensure the implementation of mobile learning ready. For this to happen, departments must recognize and respect the benefits of mobile learning. This perspective explains why it was found that the enabling variables for the hypothesis were insignificant.

The consequence of these findings is that when teachers are supported by their organization when utilizing mobile learning, they will find it easier to implement, approve, and use mobile learning efficiently. Such obligations that might have a direct impact include, but are not limited to, easy coordination with mobile learning tools providers so that they can provide ongoing support to teachers; and undertaking an effective review of the mobile learning (Al-adwan et al., 2018). A successful assessment of teacher's readiness in the organization to be transferred to the mobile learning should take efficiency, cost effectiveness, and functionality into account. The department should implement an efficient process to assist teachers in discovering the tools required for migration. Emails, document management, teamwork tools, efficiency tools, and long-term preservation of dormant information are examples of such tools.

An organization might hire skilled IT experts or trained personnel to assist them in identifying the weaknesses, strengths, prospects, and threats for each mobile learning model. When this is completed, the organization may be in a better position to choose a feasible model. As a result, as proven in this study, the enabling condition has unintended impact on mobile learning readiness.

### **5.2.3. Research objective three**

To achieve this, a conceptual framework that highlighted the interdependence of the constructs and the contributions made by each construct to the implementation of mobile learning readiness was developed. The hypotheses proposed in chapter four were examined in accordance with the discussion and interpretation of results, and five (5) out of six (6) of the hypotheses were supported.



**Figure 5. 1 Research Model**

Table 5.1 below provides an overview of the construct and attributes that were utilized in the study:

**Table 5. 1: construct and attributes**

Construct	Attributes
Need Change Readiness	<ul style="list-style-type: none"> <li>• Need satisfaction and identification for the change,</li> <li>• Teachers are dissatisfied with the existing system because it is inaccessible, unavailable, and unreliable,</li> <li>• Being aware of factors that might cause the present system to be underutilized, and</li> <li>• Comfortability with technology.</li> </ul>
Organizational Readiness	<ul style="list-style-type: none"> <li>• Currently implemented ICT government policies,</li> <li>• Organizational culture, work ethics, and</li> <li>• Resources Availability</li> </ul>

Teachers readiness	<ul style="list-style-type: none"> <li>• Information about the benefits of mobile learning,</li> <li>• Teachers' readiness to learn more and become knowledgeable about the effects of mobile learning, and</li> <li>• Establishing and comprehending the financial benefits of mobile learning.</li> </ul>
Perceived Ease of Use	<ul style="list-style-type: none"> <li>• Age, education, and previous expertise with networking technologies are some of the personal factors,</li> <li>• Technology that reflected individuals' opinions of newly developed technology, which assessed issues including the system's usability and friendliness, and</li> <li>• Mobile learning network providers, since some users could be well experienced with a technology than others.</li> </ul>
Perceived Usefulness	<ul style="list-style-type: none"> <li>• Level of service quality,</li> <li>• Users Satisfaction and</li> <li>• Benefits expected from Mobile Learning.</li> </ul>
Facilitating Condition	<ul style="list-style-type: none"> <li>• The organization's readiness and ability to assist users and the personnel of the ICT directorates in adopting and using mobile learning, and</li> <li>• ICT government departments have adequate resources and employees to use contingency and help desk services.</li> </ul>

### 5.3. Research Contribution

The reviewed literature showed that the readiness for mobile learning still had problems, obstacles, and gaps. As a result, the study discovered and addressed the gaps that contributed to teachers' mobile learning readiness ineffectiveness. This study has contributed.

#### 5.3.1. Theoretical Contribution

Mobile learning environments are essential at organizations or department of basic education because they cater for and support teachers in their teaching and learning regardless of time, expense, or distance constraints. This type of learning environment is usually used by innovative organizations that need to improve the quality of education they provide. However, the tools are not developed to suit teachers in underdeveloped countries like South Africa. As a result, the study adds to the current body of knowledge by filling gaps in the restricted literature on teachers' mobile learning readiness. The criteria and model developed will also initiate future research to expand on what the study already examined in order to further enhance the developed mobile learning model for developing countries. Finally, because the proposed framework may be utilized and referenced by other studies in connection to mobile learning implementation in The Limpopo department of basic education, this study will make a substantial theoretical contribution.

### 5.3.2. Practical Contribution

The study investigated teachers mobile Learning readiness in the department of basic education and identified factors that might assist in developing the mobile learning model for mobile learning readiness assessment in south African rural high schools. The developed mobile learning model will assist teachers in basic education department in making informed decisions on areas that need to be addressed for mobile learning readiness to be effective. Complexity can be minimized by making the tools more user friendly, allowing teachers to navigate easily. As a result, the developed model will greatly contribute to the successful TMLR. Effective mobile learning readiness promotes teachers in the department of Limpopo basic education to shift from traditional pedagogies to mobile learning pedagogies. Therefore, the school will recruit and maintain full-time teachers who are working and from diverse regions at the same time. As a result, learning standards in South African department of basic education will increase.

### 5.4. Limitation of the study

The research was limited to six South African high schools, in the rural area of Limpopo department of basic education. Due to time restrictions, the study could not include more schools; data from department of basic education in other South African provinces may have offered more insight about the factors that could be utilized to develop the TMLR model. The sample population was collected from the schools of Mutshindudi, and Tshinane circuit (all situated in the same province of Limpopo). The study's findings might have reflected contradictory impressions of



mobile learning readiness from other departments of education if the sample was collected from all regions.

### **5.5. Recommendation and future work**

The study recommends that more research be conducted to assess the readiness of teachers in using mobile learning tools at the department of Limpopo basic education, since they are the primary users of mobile learning. Because learners are influenced by their teachers to utilize or not to utilize these technologies, if the teacher continues to utilize the process, such as printing out homework and handing them to learners in the classroom, as well as teaching learners on hardcopies, the learners will not use these mobile learning technologies. As a result, the readiness and potential usefulness of mobile learning will be limited.

The study also recommends that future studies involve diverse education organizations in order to obtain different perspectives on mobile learning. The study further recommends additional qualitative research to learn more about the issues that prevent deprived countries from benefiting from mobile learning. Furthermore, the research recommends that a comparison study be conducted to analyze the success of mobile learning readiness in the department of basic education in developed and developing countries. This will indicate where the department of education in undeveloped countries are headed in terms of growth. The research would also show where the rural high schools in developing countries, like south Africa, are in terms of progress toward the growth of mobile learning. As a result, the study recommends that management at the Department of Limpopo basic education:

- must reconsider the structure in order to guarantee that there are enough technologies to meet the needs of their teachers.
- Examine their network support to tackle network and internet coverage issues that obstruct mobile learning efficacy.
- Incorporate mobile learning programs into departmental policy. Department of Limpopo basic education should make mobile learning use essential for teachers and learners, as the tool's success is based on both the teachers and the learners.
- Constantly assist teachers and learners by delivering training and workshops on how effective mobile learning can be and how they may profit from it.

## 5.6. Conclusion

According to the study findings, the opportunity to teach and learn from anywhere, at any time, is most appealing. This is only achievable with the help of mobile learning (Darmaji et al., 2019a). However, there are still gaps that must be filled before mobile learning readiness model may be developed to meet the needs of teachers in South African department of basic education. The study found that teachers in Limpopo department of basic education have enough mobile technologies and that they are not technologically challenged; rather, they lack organizational and technical support in the form of infrastructure, which prevents them from full usage mobile learning.

In terms of technological factors, the survey found that teachers had issues with restricted devices, poor or unavailable networks, lack of access to facilities after school, rapid time-out, and slow download speed. As a result, schools must reconsider their infrastructure to guarantee that the challenges that teachers may encounter regarding utilization of mobile learning can eventually be solved, as this is what may hinder teachers' mobile learning readiness. Furthermore, the study found variables that helped in developing mobile learning readiness assessment model in South African rural high schools, so that teachers from high schools in rural area of underdeveloped countries, such as South Africa, may also benefit from the advantage of the exciting blended learning on mobile learning. After evaluating the relevant literature for this investigation,

The study model was developed after identifying six factors that may influence the development of TMLR model. The hypotheses were developed and tested. Only five factors were identified to be relevant in developing the TMLR model for South African rural high schools. The data analysis revealed that only five of the six factors proposed hypotheses in the study model were demonstrated to be meaningful in TMLR model.

These factors are the need change readiness, organization readiness, teachers' readiness, perceived ease of use, and perceived usefulness. The facilitating condition factor was discovered to be negligible for the study. Teachers' readiness was found to be the most important of the five characteristics that were found to be significant to the study, with a p value of 0.001, while facilitating conditions was found to be the most insignificant, with a p value of 0.855. When a large

sum of money is spent for these tools, under-utilization of mobile learning offered by the organization represents a significant loss to the organization (Alaba et al., 2022). It suggests that the organization is not receiving a return on their investment. Traditional teaching method comes with several boundaries that prevent organizations from developing rapidly. As such mobile can give flexibility and efficiency in teaching and learning. As a result, the study identified the need for a TMLR model that is developed to fit the demands and socioeconomic backgrounds of teachers in underdeveloped countries.

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## APPENDICES

### Appendix A



**Tshwane University  
of Technology**

FACULTY OF ICT

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DEPARTMENT OF INFORMATICS

#### **PROJECT TITLE:**

MOBILE LEARNING READINESS ASSESMENT MODEL IN SOUTH AFRICAN RURAL HIGH SCHOOL: A CASE OF LIMPOPO PROVINCE

Primary investigator: Mmbudzeni Manyadze, Masters in Computing

Supervisor: Dr T.S Adeyelure, Department of Informatics, Tshwane University of Technology, Soshanguve

Co-Supervisor: Ms. R.C. Mogase, Department of Informatics, Tshwane University of Technology, Soshanguve

Dear potential research participant,

You are invited to complete questionnaire that forms part of my formal Masters in computing studies.

This research seeks to assess the readiness of mobile learning in rural area high schools of South Africa. Mobile learning has the benefit of flexibility for teachers and learners as they are not limited to learning in one place or at one time and can utilize smartphones, tablet computers, podcasts, videos and many multimedia applications. This study will assist in supporting collaborative learning, active engagement by teachers and learners, it is aimed at achieving a better teaching and pass rate. It will support multiple mobile devices and will create a clear learning path where teachers receive ongoing updates and notifications related to the subjects they are studying. In order to achieve the main purpose of the research, several interim goals need to be achieved. These are: To identify the factors influencing readiness of teachers towards mobile learning in rural South African high schools, to determine the influence of the identified factors to the teachers' mobile learning readiness in South African rural high schools.

To utilize the identified factors in developing a mobile learning readiness assessment model for South African rural high school

If you decide to take part in the study, you will be required to respond to the questionnaires with close-ended questions. You will be asked to respond to questions regarding teachers' mobile learning readiness. It should not take more than 25 minutes to complete the questionnaire.

Completion of the questionnaire involves no foreseeable emotional discomfort or inconvenience to you or your family.

The results of this questionnaire will have no direct personal benefit to you, but you will make a contribution towards a better understanding of what it is like to use mobile learning devices for learning purposes in a rural area. It will also help with the enhancement of the usage of mobile learning devices for learning in a rural area school and promote usability for teachers. Please note that you will not be paid or compensated in any other way to participate in the study.

Your participation in this study is entirely voluntary and anonymous. You have the right to withdraw at any stage without any penalty or future disadvantage whatsoever. You do not have to provide the reason/s for your decision. Your withdrawal will in no way influence your continued relationship with the research team. Note that you are not waiving any legal claims, rights or remedies because of your participation in this research study. All information obtained from the

questionnaire is strictly confidential.

All of the data that you provide in the questionnaire will be handled confidentially. Access to your data will be limited strictly to the researcher, supervisors of the study and the designated examiners (appointed by Tshwane University of Technology). Your questionnaire answers and information will be kept and stored in a confidential format that will only be accessible to the researcher. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. The results of this study might be published in a scientific journal and/or presented at scientific meetings, but again without revealing the identity of any research participant. The original questionnaires will be stored in a safe place for three years, after which they will be destroyed. The institution's name will not be used, it will be referred to as a 'Privileged School in a Rural Area'.

The Faculty Committee of Postgraduate Studies and the Faculty Committee of Research Ethics of the Faculty of ICT, Tshwane University of Technology, have approved the formal study proposal. The ethics clearance number is Ref #: FCRE/ICT/2019/08 / 007(1) Also, the Department of basic education has granted written approval for the study. All parts of the study will be conducted according to internationally accepted ethical principles.

The primary investigator, Ms. M Manyadze, can be contacted during office hours at her cellular phone at 072 499 8128. The study leader, Dr T.S Adey lure, can be contacted during office hours at e-mail Adey lureTS@tut.ac.za. Should you have any questions regarding the ethical aspects of the study, you can contact the chairperson of the TUT Faculty of ICT Research Ethics Committee, Dr C Du, during office hours at Tel (012) 382 9943/9536, e-mail [DuC@tut.ac.za](mailto:DuC@tut.ac.za). **Alternatively, you can report any serious unethical behavior at the University's Toll-Free Hotline 0800 21 23 41.**

Your participation and co-operation in this study will be highly appreciated.

### PART ONE: GENERAL INFORMATION

This section investigates your mobile devices, Internet and Mobile Learning knowledge and Experience. Kindly chose an appropriate choice from the Options provided by the use of a tick (√) or a cross (X)

1. Do you have a smart Phone, tablet or a Laptop?

Yes	No

2. On average how do you rate your knowledge of using mobile devices?

Never Used	Weak	Average	Good	Excellent

3. How often do you use mobile devices?

Don't use	Once a Month	Once a week	Once a day	Several times a day

4. How do you rate your knowledge of using the internet?

Don't use	Weak	Average	Good	excellent

5. How often do you use internet?

Once a week

Don't use	Once a Month	Once a week	Once a day	Several times a day

6. Are you familiar with the term mobile learning?

A little familiar

Not familiar	A little familiar	Familiar	Very familiar

7. Do you use mobile applications for learning purposes?

No

Yes	No	Maybe

8. Which of the following application have you ever used?

	WhatsApp
	Zoom
	Facebook Messenger
	Utube
	Google chat
	Email

PART TWO: PERCEPTIONS ABOUT MOBILE LEARNING CONCEPT

Using a rating scale of 1 to 5, where 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree and 5 = strongly agree. Indicate your level of disagreement /agreement with the following statements:

A TECHNOLOGY READINESS INDEX

9. NEED CHANGE READINESS

Below are some statements about your opinion of need change readiness in mobile learning

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
There is a need to change from our current teaching and learning system to Mobile Learning.					
Teachers are currently dissatisfied with the current classroom-based learning system as the only method of learning.					
Occasionally we experience irregular network problems.					

Poor teaching and learner's performance issues experienced are normally due to limited learning period.					
I am comfortable with continuous IT changes.					

## 10. ORGANIZATIONAL READINESS

The factor assesses the organization's readiness for mobile learning systems.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Our organization has clearly articulated the ICT regulations and policies that we follow.					
Employees in our department have a clear understanding of the ICT policies.					
The organization hires adequately trained personnel to deal with networking services.					



The department of education provides training programs to the teachers and other personnel.					
In our organization networking facilities are used to a large extent.					

### 11. TEACHERS READINESS

It is necessary to determine to what level the department of basic education and its teachers participate in the networked environment.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I have a clear understanding of Mobile Learning.					
Teachers in the Department of basic education have a clear understanding of mobile learning.					
Teachers in the department of basic education are willing to learn and acquire					

knowledge of mobile learning.					
Our school has put in place steering committees for new ICT projects.					
Our school Management clearly explains and communicates the need for ICT changes.					

## B. TECHNOLOGY ACCEPTANCE MODEL

Using a rating scale of 1 to 5, where 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree and 5 = strongly agree. Indicate your level of disagreement /agreement with the following statements:

### 12. PERCEIVED EASE OF USE

The statements below reflect your personal opinion on whether mobile learning system is easy to use and your willingness to use the system.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
It is simple for me to learn how to use mobile learning systems.					
Many teachers find new technology easy to use than the old one.					

I have the skills necessary for mobile learning.					
It is simple to learn the various aspects of a mobile learning.					
We have enough teachers and capacity to embrace new changes.					

### 13. PERCEIVED USEFULNESS

The statements below reflect your personal opinion of the usefulness of mobile learning as well as your acceptance and preference for using mobile learning in teaching and learning.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I find the mobile-learning system easy to use.					
Some old-aged members of our department may reject IT changes as they don't find them useful.					
Some non-skilled members of our department may reject					

IT changes as they don't find them useful.					
I find Mobile learning useful.					
Using Mobile learning will help me not to miss daily lessons					

#### 14. FACILITATING CONDITIONS

Facilitating favorable conditions will have a direct positive impact on mobile learning readiness.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Our school always accepts the innovations of our department.					
In case of changes that needs training of teachers our school is always willing to provide it.					
Our department has enough budget to carter					

for new changes and innovations.					
We have enough teachers and capacity to embrace new changes.					

15. PART THREE: PARTICIPANTS' DEMOGRAPHICS

PLEASE MAKE A TICK (√) or CROSS (X) IN THE BOX CORRESPONDING TO AN ANSWER THAT YOU FILL SUITABLE FOR THE QUESTIONS

15.1. Which unit are you in?

Administrative	Academics

15.2. What is your age group?

20-30	31-40	41-50	51-60	61+

15.3. What is your gender?

Male	Female

15.4. What is your highest level of education?

Certificate/High School	Diploma	Bachelor/B-Tech	Postgraduate	Other please specify

15.5. What are your years of working experience?

Below 5	5-15 yrs	16-22 yrs	23-30 yrs	31 + yrs