UNIVERSITY OF ZULULAND

UTILISATION OF SMARTPHONES AS MOBILE-LEARNING TOOLS IN SECONDARY SCHOOLS AT KING CETSHWAYO DISTRICT: PERSPECTIVES OF SCHOOL MANAGEMENT TEAM MEMBERS AND EDUCATORS

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Submitted in the fulfilment of the requirements of the Degree of Doctor of Education in the Department of Social Sciences Education in the Faculty of Education at the University of Zululand

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November 2021

DECLARATION

I, the undersigned, declare that this dissertation entitled "**Utilisation of smartphones as mobile-learning tools in secondary schools at King Cetshwayo District: Perspectives of the school management teams (SMT)**" is my original work and it has never been presented in part or whole to any institution or Board for the award of any degree. I further declare that all the sources and information used and quoted have been indicated and duly acknowledged by means of complete reference.

Signature :…  Date:04/04/2022

ABSTRACT

The adoption and acceptance of mobile technologies as mobile learning(m-learning) tools in the education sector has brought benefits and opportunities for teaching and learning. The main aim of the study was to determine and explore the perceptions of School Management Teams members (SMT) i.e. principals and head of departments, and educators on smartphones use as m-learning tools in selected secondary schools at King Cetshwayo District. The study employed a mixed method approach and the explanatory sequential research design to achieve the main aim of this research. The SMT members and educators in secondary schools are key role players on technology use and acceptance in secondary schools for teaching and learning purposes. The Unified Theory of Acceptance and Use of Technology (UTAUT) was employed as the theoretical framework that underpinned this study. This research study was conducted in King Cetshwayo District's secondary schools which is one of the largest district in KZN (Kwa-Zulu Natal) province. Questionnaires and semi-structured interviews were used as instruments to collect data in purposively selected secondary schools. The study respondents were SMT members and educators. The research piloted its questionnaire and it interview schedule in one secondary school which was not part of the ten selected secondary schools. The instrument used in the pilot study was used also in the main study because there were not changes after the pilot study revealed required results by the researcher, so that is the reason why it was also adopted without no changes for the main study. King Cetshwayo District has a total of 44 secondary schools for this study only ten were purposively selected. In the ten

selected secondary schools 140 questionnaires were issued and 135 were collected, from the 10 planned interviews only 8 were conducted. Firstly, the study collected quantitative data from SMT members and educators, then followed with qualitative data from the principals. The main study findings revealed that the SMT and educators need training, skills development programmes on the use and adoption of smartphones as m-learning tools in secondary schools. The respondents indicated the type of staff development they require and how and when this training should take place. The study concluded by designing a model for secondary schools use and adoption of smartphones as m-learning tools in secondary schools. The model also show how the SMT members and educators could influence and motivate the smartphones use as m-learning tools in secondary schools.

KEY WORDS: m-learning, smartphones, School Management Team, educators, secondary schools, teaching and learning, educational technology.

WORD COUNT: 60153

DEDICATION

This work is dedicated to GOD Almighty for the courage He has given me, to my late parents, my wife to be and our only daughter, and mostly to my brothers and sisters for the love they have for me. Much appreciated thanks to supervisors, friends and my entire family who supported me from the start to the end of this project.

ACKNOWLEDGEMENTS

I thank GOD, for giving me this opportunity and the strength, knowledge and skills to execute this work. I also appreciate the support, courage and gratitude from the following:

- Professor Bongani Gamede, my supervisor and Dr Chinaza Uleanya, my co-supervisor for their guidance coaching, and constructive comments leading to the completion of this thesis.
- The USDP (Phakamisa Group), especially the project leaders and other scholars we were studying with towards our doctoral studies, may GOD Almighty continue to bless and guide them throughout their journeys.
- The Department of Social Sciences Education and the Faculty of Education staff members for providing a conducive environment for me to work towards this project I thank you all.
- The teachers and principals of secondary schools who participated in this study, for their valuable time and contribution.
- Lastly, to my friends, family and colleagues for encouraging me to carry on during the difficult times.

LIST OF ABBREVIATIONS AND ACRONYMS

4IF	Fourth Industrial Revolution
HoD	Head of Department
BYOD	Bring Your Own Device
DBE	Department of Basic Education
DoE	Department of Education
GDE	Gauteng Department of Education
ICTs	Information Communication Technology
GPS	Global Positioning System
IT	Information Technology
SMT	School Management Team
LMS	Learner Management System
TPACK	Technological Pedagogical Content Knowledge
UTAUT	Unified Theory of Acceptance and Use of Technology
COVID-19	Coronavirus Disease of 2019
KCD	King Cetshwayo District
RED	Revolutionising Education through Technology
OS	Operating System
WET	Work Extending Technologies
SMS	Short Message Service
HE	Higher Education
PDA	Personal Digital Assistant
BI	Behavioural Intention
NDP	National Development Plan

UNICEF	United Nations Children Fund
TAM	Technology Acceptance Model
PEOU	Perceived Ease of Use
PU	Perceived Usefulness
TRA	Theory of Reasoned Action
TPB	Theory of Planned Behaviour
C-TAM-TPB	Combined TAM and TPB
DOI	Diffusion of Innovation Theorem
SCT	Social Cognitive Theory
MM	Motivational Model
MPCU	Model of PC Use
MMS	Multimedia Message Service
HTML	Hype Text Markup Language
WAP	Wireless Application Protocol
JAVA	Just Another Virtual Architecture
GUI	Graphic User Interface
IBM	International Business Machines
PC	Personal Computer
4G	Fourth Generation Wireless
5G	Fifth Generation Wireless
NASGB	National Association of Schools Governing Bodies
LCD	Learner-Centred Design
PD	Participatory Design
SAMR	Substitution, Augmentation, Modification, Redefinition

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CHAPTER 1

BACKGROUND OF THE STUDY

1.0 Introduction

The COVID19 pandemic has brought disturbance and uncertainty in the education sector in many countries including South Africa (Mhlanga & Moloi, 2020; Joshi, Vinay & Bhaskar, 2020). The disturbances brought about the necessity of using mobile technologies and new strategies so that teaching and learning can be effectively delivered remotely. However, most secondary schools at the King Cetshwayo District suspended teaching and learning during the COVID 19 outbreak. While the use of smartphones as m-learning tools in secondary schools could have effectively and efficiently supported and delivered teaching and learning in secondary schools during the COVID 19 pandemic outbreak. There are, however, challenges brought about the systematic Information Technology (IT) infrastructure for schools which inhibits effective teaching and learning to take place. Therefore, the COVID19 period has validated the need and use of smartphones as mobile-learning (m-learning) tools and educations reliance on smartphone technology thus becoming unavoidable. M-learning is defined as learning through mobile devices (Roberts & Spencer-Smith, 2019). The smartphone and tablets are leading the industry as the most used mobile technologies around the world. Both smartphones and tablets are the most manufactured, owned and used technologies in the 21st century by adults and young people. Additionally, the cost of owning and using these mobile technologies is becoming cheaper. Mobile learning content, knowledge, and information can be accessed through the smartphone; basically m-learning requires wireless networks, mobile networks and mobile technologies to be at its best practice.

Smith, Stair, Blackburn and Easley (2018) state that smart phones can be considered as a component of Information Communication Technology (ICT) which can be adopted by

educators as instructional material. The initial reason for the inclusion of smartphones in teaching and learning institutions is to promote learning and to ensure that the learning environment increases students participation (Aljaloud, Gromik, Kwan, & Billingsley, 2019; Yu & Conway, 2012).

In addition to being a tool for communication, mobile phones are a vital part of each individual's social and professional lives. In both developed and developing countries, mobile phones are widely used even during learning processes (Roberts & Spencer-Smith, 2019). Technological advances have brought additional opportunities to mobile learning in the new era, making it possible and easy to enrich individual learners' learning experiences. (Qureshi, Khan, Hassan Gillani, & Raza, 2020; Eteokleous & Ktoridou, 2009).

The opportunities offered by the most recent mobile technology (smartphone), present new opportunities and challenges to educational systems. Abubakari, Sumaila, and Abdulai (2021); Caverly, Ward and Caverly (2009), confirm that with the 3G internet-capable mobile phones, there are over 60 000 apps (software applications) and these apps are promising to be part of educational development. Lediga and Ngoepe (2020), state that state that it is gradually becoming more prevalent and diverse in different educational sectors, both in developed and developing countries, to use wireless, mobile, portable, and handheld devices. Wireless mobile technologies use in education provide various styles of learning that suits different needs of learners of the 21st century. Mobile technologies are mobile devices that have a web browser, instant messenger system, audio recorder, audio player, video recorder and gaming system etc. (Bulus 2020; Ahmed, 2016). Their mobility feature allows the user to stay connected in performing a variety of tasks on the move, unlike computers (Memon et al., 2020; Ahmed, 2016). These mobile technologies are able to share electronic media content like photographs, videos, and data wirelessly via radio waves, microwaves, infrared, Global Positioning System (GPS), and Bluetooth media sharing protocols, such as voice, text, video, and barcodes. GPS

is a United States of America owned utility that provides users with positioning, navigation, and timing services. They are mostly classified by the type of wireless communication technologies the device supports, the portability of the device and the personal usability (Bulus 2020; Crow 2007). These mobile technologies include cellphones, Tablets, PDAs, Smartphones, and Notebooks which uses the (GSM), Bluetooth and other wireless communication protocols. According to Correa, Pavez, and Contreras (2020) there is so much movement of the internet viewing because many internet users view via the smartphone or tablet. Memon et al., (2020); El-Hussein and Cronje (2010) state that advancements in the mobile technologies industry through the smartphone and tablet has resulted in ubiquitous computing lifestyles that encompass social, professional, educational, and economic aspects and space. These advancements in mobile technologies have opportunities and benefits for secondary schools to be supported in advancing teaching and learning. The smartphone ease connection to the internet and provide learners with more resources that enable them to expand their knowledge and share with peers at the same time.

One of the challenges that was faced by the researcher while conducting this study was that there is not much literature on the use of smartphones as m-learning tools in secondary schools. Additionally, there are also several researchers such as Coetzee, Leith, and Schmulian (2019); Kadry and Roufayel (2017); Krevitt (2013); Parents24 (2013), who advocate for the exclusion of smartphones as a learning tool for secondary school learners. They further argue that it is a source of distraction that deprive learners from achieving their goals. However, other researchers such as Yu and Conway (2012); Parents24 (2013) opine that the use of smartphones within institutions of learning in the 21st century performs various important roles. For instance, it enhances learners' social abilities, connects them to the global world and makes learning interesting and easy.

Hence, the reason for this study was to explore the perceptions or perspective of SMT members and educators on the roles that the Department of Basic Education (DBE) can play in using smartphones as m-learning tools in secondary schools. Furthermore, by conducting this study the researcher wanted to explore the strategies that can be adopted by secondary schools' educators in promoting the use of smartphones as m-learning tools. There is a need to increase access to learning materials through electronic platforms in teaching and learning institutions. So, this study recommended a model that can be used by secondary school educators to use smartphones as m-learning tools in King Cetshwayo District (KCD). The KCD was choosen as the location of the study because the district consists of many secondary schools located in townships, rural areas and urban areas. Its geographically location covers different contexts of secondary schools in understand the phenomenon of the study.

1.1 Preliminary literature

The 21st century environment calls for secondary schools to re-imagine the curriculum to be suitable for the use of the smartphones (mobile technologies) as tools for teaching and learning. In March 2020 most educational institutions around the world were brought into a stand still because of the COVID-19 pandemic. However, those institutions with readily available strategies for teaching and learning in the 4IR, were able to continue their teaching and learning via the use of mobile technologies. 4IR is known in the educational context as education 4.0 is a technological system that relates to the study because its priorities the use of mobile technologies as tools in education. Additionally, the 4IR is driven by the use of smartphones and other mobile technologies as tools in different industries. New technologies do not necessarily replace old technologies but they build on them, same thing applies to the type of learning and knowledge required. The use of smartphones in creating efficiencies in teaching

and learning for secondary schools. This will require new and different skills from educators to use these devices as m-learning tools in secondary schools. Education has to be a system that ensures human labour keeps pace with technological advancement. The traditional packaging of all subjects' knowledge, skills and competencies in secondary schools' education requires the smartphone access, integration, and use to adapt to the 21st century teaching and learning environment.

Smartphones are regarded as one of the emerging technologies which are referred to as tools that are emerging to develop learners in the 21st century (Kaimara, Poulimenou, Oikonomou, Deliyannis & Plerou,2019; Gachago, Ivala, Backhouse, Bosman & Bozalek, 2013). The history of the smartphone is dated way back in 1993 with the "Simon" from International Business Machine which was predominantly used by corporate users as it was purely designed for businesses, so it was an enterprise device (Sarwar & Soomro, 2013; Gowthami & Kumar, 2013). The researchers view is that the evolution of smartphone technologies by the vendors, made users around the world to be drawn to learning new outreach possibilities inherent in the smartphone applications. Smartphones use different operating systems such as iOS, Android, Blackberry OS, Windows Mobile (Gotz, Stieger, & Reips, 2017, Sarwar & Soomro, 2013) that allows them to connect to the internet, play video games, navigate, record video and audio, send and receive emails and much more (Mavhunga, Kibirige, Chigonga & Ramaboka, 2016). Different authors define the smartphone differently, for instance, Salcines-Talledo, Gonzalez-Fenandez, and Briones (2020); Woodcock, Middleton and Nortcliffe (2012); Litchfield, (2010); Pitichat, (2013) define it as a powerful pocketed, user-owned computer device with highly customised platforms for communication, organisation, information production, and content management. Hence, what made it smarter were its developments and evolutions so people started to call it "smartphone" (Pitichat, 2013).

It is important to note that if all the features of smartphones are utilised, secondary school learners can benefit. It also reduces the costs of buying books and carrying large bags as smartphones are held-hand pocketed small computers. Smartphones are becoming cheaper, more upgraded, and spread around the world at a faster pace overtaking the PC technology which has dominated the market before. The smartphone and tablets are leading the industry as the most used mobile technologies around the world. Both smartphones and tablets are the most manufactured, owned and used technologies in the 21st century by adults and young people. Additionally, the cost of owning and using these mobile technologies is becoming cheaper. They provide the users in developing countries with access to the internet to provide more learning resources, therefore education systems in developing countries can be provided with a massive amount of educational and learning resources via smartphone use as a learning tool (Bulus, 2020; Sarwar & Soomro, 2013; Attwell, 2005).

Starkweather and Stowers (2009) investigated the potential role of the smartphone as a valuable discovery tool for library users, founded 77% internet experts agreed that mobile phones would be primary connection tool so libraries have started designing mobile learning application to assist users to access the libraries services (Starkweather & Stowers, 2009). While Kadry and Roufayel (2017); Yu and Conway (2012) examined the smartphone as a potentially powerful learning tool for students in Higher Education institutions. The researcher agrees with the last two authors that the smartphone has a potential as an m-learning tool for students and library users in their different contexts. Smartphone use in learning as the tool is going to enhance mobile learning to another level, because of its ubiquitous nature and open access to the internet (Al-Emran, Alkhoudary, Mezhuyev, & Al-Emran, 2019; Attewell, 2005; El-Hussein & Cronje, 2010) and for the fact that it makes learning to takes place anytime and anywhere.

Smartphones are permanently connected to the internet type of device using an open access operating system which allows the learners to customise learning according to their own needs.

This customisation allows the users to do what they want to do with the device (Yu & Conway, 2012). The smartphone is also referred to as Work Extending Technologies (WET), meaning they allow the user to work and be productive away from offices or organisational premises (Thulin, Vilhelmson, & Johansson, 2019; Rodrigues, 2011). Therefore, smartphones' use as electronic-learning (e-learning) tools by secondary schools may allow learners to learn even beyond classroom walls extending their learning hours. The researcher focuses on the evolution of the smartphones as the potential tool to enhance and enable e-learning in secondary schools, where technological resources (i.e. computers and laptops) are minimal. Moreover, many research studies around the globe (Bulus, 2020; Chisango & Marongwe, 2021) view the smartphone as the device that is going to bridge the technology divide between developed and developing countries through its use for social and professional context and its dominance in the market of technological devices.

Kacetl and Klimova (2019); Ahonen (2008) assert that the latest emerging technologies through smartphone use easily promote reading and writing (texting) more than voice calling which is the oldest function of the mobile phone. Since it promotes reading and writing through social media, e-mails, instant messages, and SMS, the smartphone can be part of secondary school learners tool to develop their reading and writing skills. Research studies conducted in Higher Education (HE) settings on smartphone potential use of a learning tool for students, indicated that mobile technologies devices such as smartphones, tablets, and PDA's are part of their learning tool kit (Blilat and Ibriz, 2020; Attwwell, 2005; Yu & Conway, 2012; El-Hussein & Cronje, 2010; Woodcock, Middleton, & Nortcliffe, 2012). Therefore, conducting this type of research on promoting smartphones use in secondary schools as m-learning tool can assist in providing secondary school learners' with a smooth transition to HE environment in South Africa and abroad. Moreover, most universities send students text that reminds them of due dates, examination dates and results, information that is important to the students' lives at the

university level its makes them feel like part of the university family and to do better academically. Irrespective of peoples' location the smartphone developments and use in a social and professional context has been integrated to people's lives promoting mobile technology use in different settings whether rural or urban (Maloney, Abel & McLeod, 2020; Pitichat, 2013).

However, it should be noted that there are some urban secondary schools which have created ways of using the smartphone as an m-learning tool, while rural secondary schools are still struggling on how to utilise the smartphone to do the same. For the urban secondary schools, the SMT and educators has the obligation to manage and control smartphone use for learning, because in most schools' educator and leaner seems to have a smartphone. Hence, it is the management obligation to manage smartphone use as m-learning tools. Therefore, this research explores how secondary school SMT members and educators perceive the use of smartphones as m-learning tools in secondary schools. SMT members and educators are supported by the National ICT Policy on technology use in schools for the betterment of teaching and learning irrespective of the context of the schools (Mwapwele, Marais, Dlamini, & Biljon 2020; Mdlongwa, 2012). Therefore, there is a possibility that secondary schools will benefit from using smartphones as m-learning tools then prohibiting them on school premises. The integration of smartphones in learning for secondary schools will also assist in preparing secondary education in the implementation of the ICT policy which promotes life-long learning through technology use. However, the smartphone uses for m-learning in secondary schools has to be contextualised according to the secondary schools' teaching and learning environment. M-learning practice and implementation have been supported by the smartphone use and other mobile technologies devices (Al-Emran, Alkhondary, Mezhuyev, and Al-Emran 2019; Kumar, Liu, Lu & Bharagava, 2013; Attewell, 2005).

Al-Emran et, al., (2019); Kumar, Liu, Lu and Bhargora (2013) state that smartphones have massive potential in transforming m-learning in rural contexts. However, researchers and technology developers need to study rural context closely to design suitable initiatives aligned to the National ICT Policy so as to implement m- learning (Kumar, Liu, Lu & Bhargara, 2013). The researcher believes that the smartphone can be customised to be relevant to the cultural and social context of schools both in urban and rural setting. Hence some of secondary schools in urban contexts have already customised the smartphone to be a relevant m-learning tool in their schools. This type of initiative can be relevant to secondary schools, provided that SMT members as initiators and developers of teaching and learning in their schools make considerations for use of smartphones. High school learners have to be equipped with skills and knowledge on how to use technology as they are the next generation of workforces that require an absolute understanding of different technologies used for enterprises to be efficient and effective. It is of utmost importance that this current research examines attitudes of secondary schools' SMT members and educators on smartphones' integration in teaching and learning for secondary schools. Most teaching and learning institutions promote continuous engagement between teachers and learners for the betterment of teaching and learning. Therefore, smartphone integration as a m-learning tool in secondary schools can promote this engagement anytime anywhere to influence knowledge sharing and work efficiency using applications such as Facebook, Youtube (video sharing site), and Google Docs (document-sharing site).

1.2 Theoretical framework

The theory that underpinned this study was the consolidated Theory of Acceptance and Use of Technology (UTAUT) edited by Venkatesh, Morris, Davis, and Davis (2003). This theory fits the study because it looks at technology adoption and its use in various contexts and in different organisational settings. The researcher is of the idea that this theory fits well for the study

because its looks at the use of mobile technologies by different organisations and the school is an organisation that can benefit from using smartphones as learning tools to enhance teaching and learning. UTAUT fulfills the primary purpose of this study which is to determine the perceptions of secondary schools' SMT members and educators in integrating smartphones as an m-learning tool in their school. This was done through the use of Behavioural Intention (BI) to use the technology and the actual usage of the technology. Smartphone use as an m-learning tool in secondary schools was the focus of the study. The study also recommended how SMT members and educators can be assisted by the DBE to implement and adopt smartphones use as m-leaning tools in secondary schools.

According to Abdulwahab and Dahalin (2010), Behavioural Intention (BI) is the major construct in the UTAUT for technology adoption because it suggests that an individual user believes that using the smartphone for m-learning will help in enhancing organisational performance. Therefore, the adoption of the smartphone as an m-learning tool by educators is determined by their BI which indicates their behaviour and belief that smartphones are useful tools for m-learning in secondary schools at King Cetshwayo District. This building part of the UTAUT was reported as more important in all measurements despite environmental settings.

1.3 Problem statement

There is a need to increase access to learning materials through mobile technologies in secondary schools. Therefore, the use of smartphones provides the opportunities to bridge the gap of learning material shortage in secondary schools. There is limited utilization of smartphones due to the lack of platforms that promote the use of smartphones as m-learning tools in secondary schools at the King Cetshwayo District. Despite the advanced developments of the mobile phones in the past decades there has been a lack of interventions in promoting

and supporting smartphone use as m-learning tools in secondary schools in the King Cetshwayo District. The researcher is of the opinion that smartphones are increasingly becoming a challenge in schools where every learner seems to be owning a smartphone. Moreover, the functional value of the smartphone uses in promoting m-learning in rural or urban secondary schools in the 21st century has been considered as a major tool that proffers solution to various challenges. The researcher was driven and motivated by the access and ownership of smartphones by educators and the SMT members. Additionally, there is limited utilisation of smartphones in secondary schools due to the lack of platforms that promote and enhances smartphones use as m-learning tools in secondary education. The study explores secondary schools SMT members and educators on the use of the smartphone as an m-learning tool to support the development of learning materials through mobile technologies platforms.

1.4 Research objectives

1.4.1. To determine the effects of using a smartphone as an m-learning tool in secondary school in the King Cetshwayo District

1.4.2. To identify ways in which the SMT can motivate learners of secondary schools to effectively use smartphone as an m-learning tool in the King Cetshwayo District.

1.4.3. To explore the roles that can be played by the Department of Basic Education in promoting smartphone usage as m-learning tools in secondary schools in the King Cetshwayo District.

1.4.4. To explore models which can be used to ensure that smartphones are used as m-learning tools to improve teaching and learning in secondary schools in the King Cetshwayo District.

1.5 Research questions

1.5.1. What are the effects of using the smartphone as an m-learning tool in secondary schools in King Cetshwayo District?

1.5.2. How can the SMT motivate learners of secondary schools to effectively use smartphone as an m-learning tool in the King Cetshwayo District?

1.5.3. What roles does the Department of Basic Education play in promoting smartphone usage as an m-learning tools in secondary schools in the King Cetshwayo District?

1.5.4. What models can be employed to ensure that smartphones are used as an m-learning tool to improve teaching and learning in secondary schools in the King Cetshwayo District?

1.6 Definition of terms

The following terms were defined for the purpose of this study:

- Smartphone – a mobile phone that performs many of the functions of a computer, typically having a touchscreen interface, internet access, and an operating system capable of running downloaded apps

- M-learning – is learning across multiple contexts, through social and content interactions, using personal electronic devices.

- ICT – information and Communication Technologies (ICTs) is a broader term for Information Technology (IT), which refers to all communication technologies, including the internet, wireless networks, cell phones, computers, software, middleware, video-conferencing, social networking, and other media applications and services

- Secondary schools – a school intermediate between elementary school and college and usually offering general, technical, vocational, or college-preparatory courses.

- School Management Teams – School Management Teams (SMT) are responsible for quality of teaching and learning. For them to improve the quality of teaching and learning effectively and efficiently, they should he able to manage their roles and functioning successfully.

- Educational technology - digital technology used to facilitate learning.

1.7 Research methodology

The study aimed at exploring the use of smartphones as m-learning tools in selected secondary schools for SMTs in the King Cetshwayo district. In achieving the aim of the study, the following methodology was adopted.

1.7.1 Paradigm

The Pragmatism paradigm was adopted for the current study. Kumar (2019) and Creswell (2014), state that the use of the post -positivism paradigm in a single study entails the collection of both qualitative and quantitative data. Post-positivism paradigm concerns with the subject of reality and moves away from purely objective stance adopted by the logical positivist. In this study, quantitative data was collected through questionnaires given to SMT members and teachers in selected secondary schools, and qualitative data was collected through semi-structured interviews held with principals from the selected secondary schools at King Cetshwayo District.

1.7.2 Research method

Based on the nature of the study and the data intended to be collected, mixed methods design was adopted. In other words, data were collected both quantitatively and qualitatively. The explanatory sequential research design was employed to explain and understand quantitative results with the collection of qualitative data. The use of the explanatory sequential design was

to explain further the study phenomenon of smartphones utilization as m-learning tools in secondary schools. That is the reason why the study firstly collected quantitative data and followed with the collection of qualitative data to further explain and understand the utilization of smartphones as m-learning tools in secondary schools. The explanatory sequential design is one of the research designs used under a mixed method approach studies. Quantitative data collected sought statistical perceptions, the collection of facts, and the study of the relationship of one set of facts to another (Bell, 1993). While qualitative data collected generated a detailed understanding and a thick description of the phenomenon of smartphone use as an m-learning tool in selected secondary schools (Shan & Corley, 2006). The quantitative data collected also assisted in testing the model UTAUT alignment to the smartphone use as an m-learning tool in selected secondary schools (Shan & Corley, 2006).

1.7.3 Population and sample

1.7.3.1 Population

The population of the study are the SMT members and teachers in secondary schools in the King Cetshwayo District. According to Mweshi and Saky (2020); Cohen, Manion, and Morrison (2011); researchers need to be able to collect data from a smaller group or subset of the total population in a way that is representative of the total population.

Table 1 represents the entire population of secondary schools in the KCD which has the is the population pf 44 secondary schools in total and the KCD was divided in clusters.

Table 1: Representing the entire population and sample size

Clusters	Total population (N) (number of secondary schools per cluster)	Sample size (n)
Kwadlangezwa	8	2
Esikhaleni	13	2

Empangeni	6	2
Richards Bay	7	2
Eshowe	10	2
Total		10

1.7.3.2 Sampling

Creswell (2014), explains that the sampling technique is the process of taking a subset of subjects that are representative of the entire population of the study. In the current study, the population was widely dispersed, the researcher grouped secondary schools into clusters for the quantitative sample size (cluster sampling), then inside each cluster, the simple random technique was employed to select secondary schools in each cluster based on similarities such as the location of schools, size, source of funding, leadership structure, amongst others. Furthermore, purposive sampling was employed to select principals from each selected secondary school to represent the qualitative sample size. Therefore, cluster sampling, simple random sampling and purposive sampling techniques were employed to select the study sample. However, it was mainly the cluster and simple random sampling techniques which were used to select the quantitative sample, while the purposive sampling technique was employed for the selection of the qualitative sample. Cohen, Manion and Morrison (2011), explain that in a mixed-method approach where quantitative and qualitative data is collected, probability sampling and non-probability sampling can be employed to determine sample sizes for each phase.

In each cluster, two secondary schools were selected to gather data from, which resulted in ten schools of which five (5) were from the rural setting and the other five (5) were from urban

setting in the King Cetshwayo District. For qualitative data, ten (10) principals were selected, which is one (1) principal per secondary school. For quantitative data, three Head of Departments (HODs) were selected from each secondary school which equals to thirty HODs. Ten (10) educators per secondary school were additionally selected which equals to one hundred (100) educators. The sample for the quantitative data was 130 respondents.

Therefore, the sample size for quantitative phase was 10 + 30 + 100 = **140,** while qualitative phase sample size was ten principals selected purposively. Cohen, Manion and Morrison (2011), states that the sample size should represent the entire population and the results gathered from the sample size should be the representative of the entire population.

1.7.3.3 Instruments

Data in research are either collected quantitatively or qualitatively through the use of various instruments. In this study, quantitative data was collected through the use of questionnaires to the SMT members and educators of the selected secondary schools at KCD. While semi-structured interviews were conducted to collect qualitative data from the selected secondary schools' principals. According to Cohen, Manion, and Morrison (2011) open-ended interviews are characterised by the exact wording, the sequence of questions is determined in advance and all interviewees are asked the same basic questions in the same order.

1.7.3.4 Analysis

The data collected for this study was analysed in two different ways; quantitatively and qualitatively. The quantitative data was analysed using the SPSS while qualitative data was analysed thematically. Kumar (2019), explains that qualitative data can be analysed through the use of thematic analysis, while quantitative data can be analysed using descriptive statistics which is one of the major functions of SPSS.

1.8 Data analysis

Simple percentage, statistical representation, frequency counts, tables as well as inferential statistics were used to calculate the data retrieved, after which explanations were made based on findings. Statistical analysis was done using Statistical Package for Social Science (SPSS) software.

1.9 Validity and reliability

Kumar (2019), stresses that validity is the ability of a test to measure what it is expected to measure, while reliability is the consistency of the instrument in measuring the expected outcome. To ascertain the validity and reliability of the instruments used for this study, the instruments was subjected to face and content validity of the supervisor and other experts in the field. A pilot test was carried out with one of the selected secondary schools' SMT members in the Kwadlangezwa cluster at KCD. Fifteen (14) questionnaires were used for piloting and data collected was used to tailor- made the instrument to suit the purpose of the study. In the qualitative phase, the principal from one of the selected secondary schools in the Kwadlangezwa cluster was interviewed to validate and tailor-make the interview schedule to suit the purpose of the study. After piloting the researcher proceeded with the entire data collection from the entire sample size in both phases.

1.10 Ethical consideration.

The researcher read the University policy on Ethics and procedures on Managing and preventing Acts of Plagiarism, and understood its content. The supervisor and the researcher considered and discussed the ethical issues that arose from this research. The researcher undertook to abide by general principles set out in the University's policies and the obligation which the policies impose on him, and to mitigate any ethical and other risks that might arise. In particular, the researcher undertook to:

- Respect the dignity, safety and wellbeing of others, including the perception of educators; members of the School Governing will respect anonymity and confidentiality.
- Consider and be sensitive to different cultures, languages, beliefs, perceptions and customs of persons who participate in or are affected by my research.
- Ensure that the research is relevant both to legal and development of needs of the schools and to the individual needs of those who may be affected by my research.
- Acknowledge and attribute to others ideas, writings that are not original.
- Reference my work accurately according to my chosen referencing guide.

1.11 Chapter division.

Below is the chapter division of the study.

Chapter 1: Orientation of the study

Chapter 1 provides the orientation of the study, including an introduction and background of the study. Furthermore, this chapter contains the statement of the problem, motivation of the study, aim and objectives of the study, research questions, and definition of concepts.

Chapter 2: Literature Review

Chapter 2 provides the conceptual framework for the study, it also explores the literature review regarding the utilisation of smartphones as an m-leaning tools in secondary schools for the SMT members and teachers within the King Cetshwayo District.

Chapter 3: Research methodology

Chapter 3 describe in details the research process, including the research approach, design and methodology followed in the study.

Chapter 4: Presentation, interpretation and discussion of quantitative data

Chapter 4 presents data analysis and interpretation of quantitative results which represent phase one of data collected and analysed. Furthermore, it presents the discussions based on the phase one results of the study which are quantitative in nature.

Chapter 5: Presentation, interpretation and discussions of qualitative data

Chapter 5 presents data analysis and interpretation of qualitative findings which represents phase two of data collected and analysed. Furthermore, it presents discussions based on phase two results of the study which are qualitative in nature. Hence, the study is a mixed method research, the merging of results of phase one and phase two using joint displays is presented in this chapter.

Chapter 6: Conclusion and recommendations

Chapter 6 summarises the results of the study and draw conclusions from the study. Limitations and recommendations are also presented.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In the first chapter, the problem under investigation was introduced and highlighted in terms of its nature and scope. The background to the study was also provided, and operational terms and other relevant concepts were defined. Furthermore, the aims and objectives of the study were outlined together with the method of the study. This chapter is presenting the literature based on the secondary data collected from articles and books to support this project, which is based on the utilisation of smartphones as m-learning tools in secondary schools. Smartphones popularity dominates all other mobile technology devices in ownership and use (Chmielarz, Zborowski, Atasever & Fandrejawska, 2021; Adorjan & Ricciardelli, 2021). Therefore, it is perceived that it has influenced the development of most operations in different industries such as science, health, marketing, businesses and education (Metruk, 2020; Ozdamli & Cavus; 2011). Hence, the literature focuses on historical background of the mobile smartphones, exploring the SMT members and teachers' perceptions, the role played by DBE in promoting smartphone usage as m-learning tools, effects of smartphone uses as m-learning tools in secondary schools. The literature also looks at the SMT roles in motivating effective use of smartphones as m-learning tool and different models used to adopt m-learning using the smartphone, educational technology

Lastly, the chapter concludes the with the discussions of the previous findings of other studies related to the current study.

2.2 Research background

The advent of COVID 19 pandemic has exposed both our teachers and learners to the need to move with accelerated speed in the usage of smartphones for remote teaching and learning in line with the 4th Industrial Revolution as expressed in the National Development Plan (NDP). Many of the schools were found wanting in terms of accessing information provided through smartphones because of the lack of connectivity and inability of educators to prepare lessons and provide feedback to learners using these gadgets.

The evolution of technology has changed the society and the lives of people especially adolescents for the better (Odgers & Jensen, 2020; UNICEF, 2011). Children are growing up in an interconnected world and mobile technologies dominate that world (Dehmar, 2009). The researcher concurs with this having observed that young children and educators in secondary schools own smartphones. Through these gadgets, learners are able to socialise with known and unknown associates. For this research m-learning is simply defined as the utilisation of the smartphone for learning activity anytime, anywhere. Additionally, Bulus, (2020); and Roberts and Spencer-Smith (2019), define it as a *"learning using the (smartphone) mobile technology irrespective of the learning context."* Haag and Alexandria (2011), define it as the "use of handheld computing devices to provide access to learning content and information resources." Regarding m-learning 'mobility' means the ability to link classroom activities to the outside world, providing learners with capabilities to learn on their own using mobile technology. In spite of different definitions of mobile learning this is still new and unclear for secondary education (Nikolopoulou et al., (2020), Quinn, (2000); Franklin, (2011); Bilos, et al., 2017). Hence, this study aims to explore the perceptions of SMT members and educators on its usage in secondary schools.

Honey (2005) survey conducted by Pew Internet and American Life Project in 2012 found out that majority of teens have cell phones, 23% have tablet computers and 95% use internet. This

statistic shows that most children owns a gadget. Therefore, it is vitally important for secondary schools' learners to use and adopt smartphone as m-learning tools in schools. It is important to note that researchers like Krevitt (2013) believe that smartphones are a source of distraction and have hindered and deteriorated the learning abilities of several learners in many secondary schools. As a researcher in the 21st century I believe that if teachers and SMT members can be competent in infusing smartphones as m-learning tools in secondary schools, nobody will see smartphones in a negative light. Furthermore, the researcher is of the view that it is the role of the DoE, SMT members, and educators to guide, promote and develop strategies which can be used in the teaching and learning process through the use of current technologies. However, on smartphones is it unclear how secondary schools at King Cetswayo District benefits from smartphone technology. Smartphones cannot be seen as distractors in secondary schools if the SMT members and educators are willing and ready to be developed and trained to come up with the interventions to guide and monitor smartphone use as a tool to aid and promote m-learning.

There are however, challenges on the use of mobile technological devices such as the smartphone, such as the fact that sometimes smartphones are abused, and thus they may not bring the intended results in the form of improved learner performance. The researcher concedes that the 21st century technology may have negative influence on learner performance, hence one of the aims of this study is to determine the effects of using smartphones as an m-learning tool in secondary schools. Today' learners communicate using Facebook, WhatsApp and other media gadgets. Over the years a growing number of parents have provided their children with powerful mobile technologies such as smartphones and tablets, for ease of access of teaching and learning materials by connecting to the internet. Therefore, smartphones are salutary elements that could benefit educators during the teaching and learning process especially if it is treated as an essential m-learning tool. The researcher acknowledges the

resurgence of mobile technologies such as the smartphone but there is confusion that it has brought about distraction in teaching and learning for secondary schools. This has been caused by the absence of adequate information of using smartphone technologies in secondary schools. However, most first world countries secondary educational leaders have found ways to integrate mobile technologies in teaching and learning so as to improve learners' performance. Therefore, the current research looks into strategies to be employed to assist SMT members and teachers to undertake processes of finding ways on how our secondary schools at King Cetswayo District could use smartphones as tools for m-learning.

It is the idea of the researcher in conducting this study to find ways to support and bring more alternatives of teaching and learning in secondary schools using the smartphone. The Unified Theory of Acceptance and Use of technology (UTAUT) (Venkatesh, Morris, Davis and Davis, 2003), is the viewing lens to be used in the study to accomplish the aim of the study which is how smartphones can be effectively used by SMT members and educators as a mobile learning tool in secondary schools. One of the eight theories building up to the UTAUT is the Technology Acceptance Model (TAM), it has two key variables which are Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) (Venkatesh et, al., 2003; Osakwe, Dlodlo & Jere, 2017). The two key variables are used to determine and explore technology adoption of gadgets such as smartphones for use as a mobile learning tool in secondary schools. Osakwe et al., (2017) explains PEOU as the degree at which an individual believes that using a particular technology would be free of efforts. On the other hand, PU is seen as the degree at which an individual believes that using a particular technology enhances his/her performance (Osakwe, et al., 2017). Based on the nature of this theory, the current research on the perceptions of MST members and educators on the uses of smartphone technology to promote mobile learning at secondary schools in the KCD. This is because smartphone evolution and its use as an m-learning tool has an important role to play in improving learners' performance.

In South Africa there are schools that have adopted smartphones as m-learning tools meaning they are using technologically aligned approaches to teaching and learning (Mutambara & Bayaga, 2020, Parents24, 2013). However, current m-learning approaches are at the initial stages of practice and adoption especially in Gauteng and Western Cape Provinces. (GDE, 2011). The use of mobile technologies was initially thought of as belonging to people of a certain class and predominantly in urban areas. However, this is no longer the case because the availability of smartphones and their prices are affordable. The smartphones such as Blackberry, Palm Pre and the iPhone are designed with more than fifty-thousand specialized apps; smartphones offers a number of technologies, including GPS tracking, digital camera with more advance mega pixel, and digital music (Yu & Conway, 2012; Iqbal & Bhatti, 2020). SMT members are an important structure in the regulations of technology use in schools.

2.3 Theoretical framework – Unified Theory of Acceptance and Use of Technology (UTAUT).

There are different theories that are used to suit the acceptance, adoption and promotion of technological devices. However, the epistemological side of this research project opted for the use of the most popular theory in technology acceptance and use; the Unified Theory of Acceptance and Technology Use (UTAUT). Venkatesh, Thong, and Xu (2013), aver that generally the UTAUT in research has repeatedly confirmed it robustness and its main effects on technology use and adoption. The researcher followed a deductive approach through specifying the theory guiding the study while indicating its important aspects, such as performance expectancy, effort expectancy, social influence and facilitating conditions of the theory. Moreover, Venkatesh, et al., 2003, states that the UTAUT explains approximately 70% of the variances in one of its constructs which is behavioural intention focusing on the adoption and usage of technology. The increase number of smartphones ownership, developments and advancements and their availability to teachers', leaners', and the societies at large supports

quick access to information and communication. Ye, Zheng and Yi (2020), employed the UTAUT to study the user willingness and readiness to accept mobility as a service for travel agencies. There are other studies that have used UTAUT and those include Ahmed, Everett, and Turnbull, (2017); Zhou, Lu, and Wang, (2010); Ahmed, (2016), these studies focused on the adoption of mobile technologies as useful tools for employees at the workplace. The UTAUT model is also be used in the education context for schools to adopt and use smartphones as m-learning tools. The UTAUT framework has been used before for m-learning studies in African Higher Education institutions and in K-12 grades (Statti & Villegas, 2020; Kaliisa & Picard, 2017). The UTAUT focuses on the important phenomenon of technology acceptance and use. There has been enough evidence of its use by 1,267 citations to the original paper by Venkatesh, Thong, and Xu, (2013).

Imenda (2014), in research studies the theoretical framework works as the view-point of viewing and interpreting the research project. Theories used and adopted theoretical frameworks in research studies consist of principles, constructs, concepts and tenants of the theory in use for this research project (Adom, Kamil-Hussein, & Adu-Agyem, 2018). The UTAUT theory was suggested by Venkatesh, et al., (2003), based on the combination of eight theories. Smartphones has penetrated almost every aspect of the society and different individuals in various organizational use it as a working tool. Hence there are different types of technologies that can be studied using the UTAUT in different organisations such as schools. The combined eight famous models/theories in their varied trainings and fields of study which builds the UTAUT are as follows:

Theory of Reasoned Action (TRA): In the unified model of UTAUT this theory is the most fundamental and influential on human behaviour, through (i) attitudes towards behaviour and,

(ii) subjective norms (Dwivedi, Rana, Jeyaraj, Clement, & Williams, 2019; Wang, Wu, & Wang**;** 2009).

Technology Acceptance Model (TAM): This model was designed to predict technology acceptance usage. It has been widely applied to various types of technologies and users. Perceived usefulness and ease of use of the technology are the construct elements of the TAM (Thongsri, Shen, Bao, & Alharbi, 2018; Wu, Tao & Yang; 2008).

Theory of Planned Behaviour (TPB): This theory is mainly known as the extension of the TRA it included the construct of perceived planned behaviour control, and Information System (IS). It has been successfully applied to understand the individual's acceptance and usage of various technologies (Thongsri, et al., 2018; Wang et al., 2009).

Combined TAM and TPB (C-TAM-TPB): This is the combination of two models the TAM and TPB, because the perceived usefulness is the predictor in both theories (Thongsri, et al., 2018; Wu et al., 2008).

Diffusion of Innovation Theorem or Innovation Diffusion Theory (DOI or IDT) – This theory was adapted from properties of innovations postulated by the IDT and refining the set of constructs that are used to explore individual technology acceptance use. These constructs include relative advantage, ease of use, image, visibility, compatibility, results indication and voluntariness of use (Thongsri, et al., 2018; Wang et al., 2009).

Social Cognitive Theory (SCT): This model consists of five core constructs, and those are: expectations, performance, outcome expectations, personal self-efficacy, and anxiety. This model is applied and extended to the context of computer usage (Thongsri, et al., 2018; Wang et al., 2009).

Motivational Model (MM): This model is for understanding the acceptance and use of new technology through understanding the intrinsic and extrinsic motivation of technology in use (Thongsri, et al., 2018; Wang et al., 2009).

Model of PC Use (MPCU): The origins of this model are based on the theory of human behaviour in using personal technologies (computers). It was used to predict P.C. use. The MPCU consists of six constructs and those are job fit, complexity, long-term consequences, effect towards use, social factors and facilitating conditions (Thongsri, et al., 2018; Wang et al., 2009).

These eight theories were studied and combined to form the UTAUT by Venkatesh et al., (2003). Based on the formation of the UTAUT four constructs were developed, designed, formed and embedded to support each of the eight theories forming the UTAUT. In the UTAUT model, the four key constructs namely, performance expectancy, effort expectancy, and social influence and the facilitating conditions. The first three constructs have a direct effect on behavioural intention, while the last one has direct effects on user behaviour (Venkatesh, Thong, and Xu, 2013). These four constructs are explained below:

Performance expectancy: It built upon five constructs from existing models which measures the sense of perceived usefulness (TAM and C-TAM-TPB), intrinsic motivation (MM), job fit (MPCU), relative advantage (IDT), and outcome expectations (SCT) (Dwivedi et al., 2017; Wang et al., 2009). According to Abdulwahab and Dahalin (2010), this is the level an individual user believes that by using ICT his/her performance improves. Moreover, there are various research studies that have proven that technology use yield much more than the expected performance (Pynoo, Devolder, Tondeur, Van Braak, Duyck, & Duyck, 2011).

Effort expectancy: It is made up of the three constructs from different models which are the perceived ease of use (TAM), complexity (MPCU), and ease of use (IDT). The effort

expectancy is the critical determinant in the early stages of behavioural intention in ICT usage (Dwivedi et al., 2019; Wu et al., 2008).

Social influence: It refers to the extent to which a person perceives the importance of using new information system through social influence. Social influences are key in shaping one's use of new technologies. Three constructs from the models capture the concept of social factors and those are subjective norms (TRA, TPB, C-TAM-TPB), social factors (MPCU) and image (IDT) (Dwivedi et al., 2019; Wu et al., 2008). The social influence construct has the most facts and ideas from six theories/models used (Dwivedi et al., 2019; Abdulwahab and Dahalin, 2010).

Facilitating conditions: are defined as the degree to which individuals believe that professional development, organisational and technical infrastructure must exist to support the use of the system (Venkatesh et al., 2003). The definition of facilitating conditions in the UTAUT model captures the concepts embedded in five different constructs which are TPB, DTPB, C-TAM-TPB, (MPCU), and (IDT) (Dwivedi et al., 2019; Venkatesh et al., 2003).

Behavioural intention: The behavioural construct has a direct impact on the individual's actual use of technology. This construct originates from the Theory of Reasoned Action (TRA). The technology acceptance model is the key factor in user acceptance research due to its importance in information management, as a result, behavioural intention was introduced to Management Information System (MIS) through the technology acceptance model (Abbad, 2021; Abdulwahab & Dahalin, 2010).

User acceptance: In this study user opinion, attitude towards use, behaviour and experiences measures the level of user acceptance (Dwivedi, et al., 2019; Abdulwahab & Dahalin, 2010). However, the main factors explaining smartphones use and acceptance in different organisational settings are based on the rational explanations such as perceived usefulness,

perceived ease of use and facilitating conditions (Busch & McCarthy, 2020). Chatterjee et, al. (2019) opted to use the UTAUT model factors in combination with the factors of Technology Acceptance Model (TAM) to determine the adoption of mobile applications for teaching-learning processes in rural girls' schools in India. Moodley et, al. (2020) state that in using the Technology Acceptance Model (TAM) as the framework of the study teachers identified two key factors that determines teachers' acceptance of mobile technology use in the classroom which were Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). These two main factors are constructs of the TAM which is one of the most used framework to determine the technology acceptance and use in different organizational settings. Below is the diagrammatical representation of the four main constructs of UTAUT. Figure 1 represents the Conceptual Model for the UTAUT which is the fisrt structure designed by Venkatesh et, al. (2003). This structure represents the constructs and variables that build up the UTAUT on it use for the adoptin of technology use in organizational context i.e. the arrows in the structure represents the relationships between constructs such as social factors, facilitating conditions has a positive impact of the User Behaviour in adopting the technology use in question in different organizational settings.

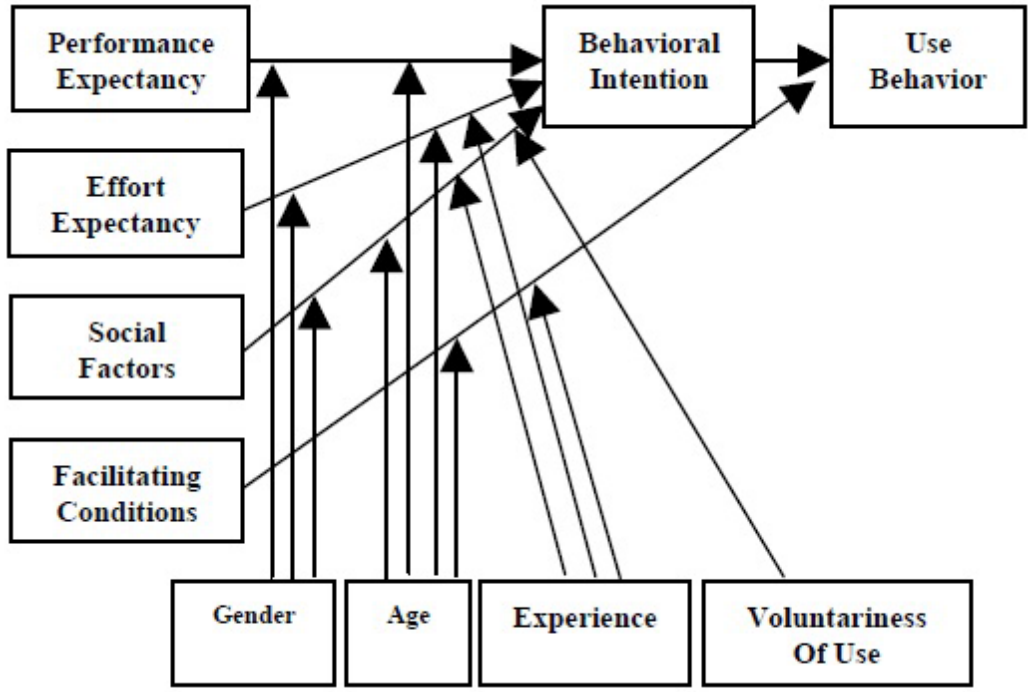


Figure 1. A Conceptual Model of UTAUT in the context of smartphones

The UTAUT model is the most acknowledged and used model to adopt and implement technology use in different organizational context. Therefore, this model suits this current research in explaining and understanding the adoption and use of smartphones as m-learning tools in secondary schools at the King Cetshwayo District. The contructs of the UTAUT shed light on the context of secondary schools on the adoption and use of smartphones as m-learning tools e.g. facilitating conditions have to be conducive to allow technology integration to any rganizational context, performance expectancy which has an influence on the performance of induviduals once smartphones technology has been adopted and used as m-learning tools in seconday schools.

2.4 SMARTPHONES AND OTHER MOBILE TECHNOLOGIES AS POTENTIAL TOOLS FOR EDUCATION

2.4.1 The history of the smartphone

The first handset considered to be the first "mobile" phone was released in 1967. Despite, its movability the challenge was the weight which was 4.5 kg (Reid, 2018; Randy, 2011). In 1973 Motorola Dyna Tac officially launched the mobile phone invented by Martin Cooper. This mobile phone took the shape of latest manufactured mobile phones with a much better weight for its movability, but it was not popular as the latest handsets (smartphones) are (Bush, Armstrong & Hoyt, 2019; Reed, 2010; Sarwar & Soomro, 2013). Additionally, Choi, Land, and Zimmerman (2018); are of the view that mobile technologies would become inextricably part of the "digital life" for many individuals around the world. This research agrees with Atwell (2005), that smartphones are to play an important role in the development of learners learning in the Fourth Industrial Revolution which is dominated by smartphone usage for different industries. There has been an increase of mobile phones subscribers especially from the period between 2000 to 2012 (Mobile Economy, 2013). There are also 3G and 4G smartphones which are based on more advanced technology providing users with much more: cheaper, smaller, more features and it is needed by everyone, even by institutions to support their services in the 21st century (Yekeen, Nicholas, & Akure, 2020)

Researchers, such as Mao (2020); Sinisalo and Karjaluoto (2009), students are more engaged in using the SMS mobile service than other users of basic mobile phones. These services include services such as Multimedia Messages Service (MMS), accessing the web with HTML Browser, e-mails, JAVA, and WAP, used to view the internet on mobile phone. Young people need easy access to the latest technologies and services provided by the smartphone, because many of m-learning activities and services can be provided through the smartphone use. As a smartphone is a dynamic tool in many industries; it can also be suitable as a learning tool. It

also has features that allows learning to happen on the move, or anytime and anywhere (Pitt et al., 2011), thus transforming and bringing many opportunities in the education sector. Research by Ahmad, Javed and Naveed (2020), revealed that respondents in their study uses smartphones over laptops and other movable wireless technologies for m-learning. The estimation of smartphones penetration in the African continent is 929,9 million by 2021 (Boateng, Annor & Kumbol, 2021). In the South African market there was 72,9% increase on smartphone subscription from 2016-2017 (Oksiutyez & Lubinga, 2021). The statistics paints a good picture of people who has access to mobile phones which can be used for education as well.

Smartphones are rising in popularity and rapidly in various fields in life such as education (Memon, Shaikth, Rind, and Dehraj, 2020). Young adults are viewed as one of the population groups that have great access to mobile network (Johnson, 2020). The smartphone technology is considered to be the best tool that enhances the performance of students (Ahmed, Salman, Malik, Streimikiene, Soomro & Pahi, 2020). The developments of telecommunication from telegrams to landlines to cell phones and to the introduction of the smartphones is a drastically change in the industry of telecommunication. The smartphones and tablets are used as recent drivers of telecommunication and mobile technologies developments have led to new ways and experiences in different settings including the education context.

Sitar-Taut (2021), asserts that researchers and educators have been attracted by the features of the mobile devices, especially by the fact that they can be used as a learning tool which can enhance the learning experience. A learning environment supported by the use of mobile technology allows the educator to focus on the body of knowledge, while allow learners to support their learning using the mobile technology. (Ahmed, 2016). Hence, some educators and leaners in secondary schools do use their mobile technologies as tools to practice m-learning without the technology being adopted by the whole schools. This implies that one of the main requirements of using m-learning as a tool for teaching and learning is own a

smartphone that will allow them to access learning materials and other resources related to their learning. Qashou (2020), opines that the value of mobile learning is reliant on the mobility of the device; hence, the focus of mobile learning should be on the mobility of the tool.

2.4.2 Current trends of smartphones in different industries

Many industries including advertising agencies, news, TV, social networking, printed books and the internet are using smartphone as a tool to facilitate their activities and reach their clients (Ahonen, 2008). Smartphones use for m-learning has the potential to support different learning ways such as, personalised learning, contextual learning, collaborative learning, ubiquitous learning, long-life learning, just-in time learning, and other types of teaching (Franklin, 2011). Global statistics for developing countries indicates that young people read from screens and get information through use of smartphones, therefore, it is necessary for teachers to meet these requirements and become capable of using latest technology and to develop innovative teaching strategies using smartphones to meet new learners learning needs (Younes, Alharbi, & Aboeldahab 2021). Additionally, authors, assert that our young people are drivers or early adopters of smartphone use, they do most things through smartphones such as listening to music, surfing the internet, downloading entertainment apps and so much more.

Smartphones devices are widely adopted and used wireless device more than any other gadget in the world (Dwidienawati, Abdinagoro & Gandasari 2020). The evolving of the smartphone technology provides more solutions and enhancements to improve users' experiences by adding more tools, features, solutions and applications. Ahonen (2008), found out that in most advanced mobile markets of the world namely Italy and Finland most of their first time mobile phone customer or user is under the age of eight. Moreover, Metruk (2020), asserts that most of the people or populations own two or more mobile phones. There is a possibility that most of our learners and educators in secondary schools own one or more smartphones. Moreover,

learners use these devices for communication and socialising with peers and friends, while overlooking the smartphone use and benefits of using it as a m-learning tool.

2.4.3 The importance and essence of using smartphones

Smartphones are the champions of the 21st century when it comes to mobile devices uses for institutions success. Generations to generations the viewing of information access has been changing since the new developments of information technology i.e. internet, computers, video games and cell phones etc. (Raza, Qazi, Khan and Salam, 2020, Bomhold, 2013). Gozum, Erkul, and Aksoy (2020), Rodrigues (2011) the smartphone appears to have the potential to replace most technological devices (iPads, laptops and PCs) through its ubiquitous nature. Researchers, such as Baldwin and Ching (2020); Little (2011); McCarthy (2010); Starkweather and Stowers (2009), highlights the potential use of mobile devices by university students to enhance their language and quick access to learning material. There are positives and negatives impacts of the smartphone in lives. Nevertheless, the researcher believes that with secondary schools' context they need built-in strategies on promoting m-learning to benefit secondary schools and promote remote teaching and learning. Therefore, with the availability of the smartphone and these built-in strategies to promote m-learning secondary schools can be operated easily. The most common disadvantages are small size screen, low battery life and it use lead to addiction. However, the smartphone advantages which are internet access, video play and recording, instant responses, and many more surpass the negatives. Earlier research on smartphone use as a tool to enhance and support organisations and institutions performance, viewed it as a distraction which hampers the productivity because people spend most of their time using smartphones for personal use (Pitichat, 2013). However, research by Schiliro (2021); Khrais and Alghamdi (2021), show that institutions and businesses who invest in mobile digital use have an enhanced workforce production and its workforce is aware of the demands of the 21st century working environment.

2.4.4 The use of smartphones in schools' context

Smartphones play a vital role in business, health institutions, educational institutions and in many other sectors especially during the COVID-19 pandemic era. Therefore, there is much to learn about the use of smartphones as m-learning tools for secondary schools even beyond the pandemic. Therefore, whether in urban or rural areas our educators need to be prepared and be ready to benefit from the use of smartphones as m-learning tools in schools. In using technologies and mobile devices such as the smartphone as an educational tools depends on the attitudes, and perceptions of parents, teachers, students and the attitudes reflected by the policy-makers (Godwin-Jones, 2017). The authors, further highlight that smartphones play a vital role on pre-service teachers' teaching methods and strategies, as they are used to obtain information about their lessons.

The majority of secondary schools in South Africa are located in township and some in rural areas of our country (Chisango and Marongwe, 2021). Most of the secondary schools face challenges such as the unavailability of required resources such as computers and laptops in order to support teaching and learning process. The use of smartphone technology in secondary schools will enable learners and teachers to connect, create knowledge and distribute it among each other at a faster pace (Oluwadara, Kolapo, & Esobi, 2020). The majority of learners attend township schools so technology developments are needed in these schools (Chisango & Marongwe, 2021; Probyn, 2009). The acceptance of the smartphone as m-learning tools in rural and urban secondary schools require technological infrastructure and a conducive environment for teaching and learning. However, as much as smartphone technology has come to stay, and it advents in the school setting is still posing challenge to many educators (Bulus, 2020:1636). The 4G and 5G smartphone brands are much quicker to access the internet where many teaching and learning resources could be easily accessed (Bulus, 2020). Smartphones act as the rightful tool to facilitate and foster m-learning in educational institutions with smart teaching

and learning anytime anywhere. It is seen as an innovative tool ready to be fully understood by secondary schools' educators as a useful education technology device for long life learning (Bulus, 2020). The smartphone is one of the best education technology tool teachers can use to produce lessons content learning materials at their convenience and disseminate to learners (Bulus, 2020:1637).

According to Hadad, Meishar-Tal and Blau (2020), economic and social factors are the most contributing factors to parents resistance of smartphones use in secondary schools. These factors play a major role is hindering the use of technological devices especially in rural schools. However, what is of interest is the ownership of the smartphones by both learners and educators in schools and they can be used as m-learning tools. Additionally, learning via smartphones can promote self-directed learning (self-directed learning refers to an individual takes an initiative to indicate their own learning needs, have the ability to determine their own learning goals and defining their own sources they need in order to learn), offering access to information at any place and time, thus enabling situated and ubiquitous learning (Hadad, Meishar-Tar, & Blau, 2020:2).

According to Oluwadara, Kolapo, and Esobi (2020) the future of education in the 21st century lies in the connectivity using mobile technologies. Therefore, educators need to start preparing themselves for the changing environments of the 21st century in terms of teaching and learning. Their readiness and preparedness would fast track the acceptance and use of mobile technologies as useful tools for teaching and learning. Nevertheless, there have been many m-learning projects in the Sub-Saharan Africa emphasising the integration of mobile technologies in instructional teaching, while less time has been spent on the training and developing teachers on integrating mobile technologies into instruction (Oluwadara, Kolapo, & Esobi, 2020). The authors, further, state that approaches of m-learning training, uptake and use do not incorporate the infrastructural deficiencies of many schools and the societies into models for training and

practice. Therefore, training of educators is a critical component in the integration of smartphone technology use as an m-learning tool in order to promote the culture of teaching and learning. The DBE ICT policy is there to facilitate ICT integration in schools, but, the practice of ICT integration in teaching and learning remains unchanged and unattended to by senior managers in schools. The use of mobile devices in secondary education schools is viewed as an emerging issue (Nikolopoulou, 2020). Furthermore, if the smartphone is properly integrated in secondary schools' settings as an m-learning tool this can promote limitless access to internet which promote easy access to required information by learners for their learning (Bulus, 2020). Therefore, it is important to determine the SMT members and educators' perceptions, attitudes, acceptance and explore their views on the strategies on how smartphones could be adopted and accepted as m-learning tools in schools.

2.4.5 Educational technology

World-wide there is a call of restructuring schools' practices in teaching and learning to support the use of ICT and digital technologies. Moreover, schools' leadership is tasked with a role to initiate re-structuring of schools to support digital technology use. The re-structuring practice to embed technologies in education requires necessary tools and skills for technology t to support and enhance the teaching and learning process. Christopoulos and Sprangers (2020) opines that there is a necessity to carefully assess and examine the rightful tools and platforms to be integrated into the educational systems, for m-learning to be successful in schools. On the other hand, Bulus (2020) state that technology plays a significant role in creating and disseminating knowledge for teachers and learners in the 21st century. In the study conducted by Can, Kucuk, and Simsek (2019), it was revealed that teachers remain the keystone of the K-12 education in the 21st century which is engulfed with so much developments of technology use in schools.

In defining *Educational technology* for Social Sciences refers to "organisation of educational knowledge for the achievement of practical purposes as well as any tool or technique of doing or making, by which capability is extended (Bulus 2020, Luppicini, 2005)." From this definition it can be deduced that smartphones can be used for improving the quality of teaching as well as by improving learner performance.

Many industries have founded their pathways heading towards smartphones use for example music, advertising and entertainment and games (Lakhani 2020; Shin et al., 2011). However little attention has been given or done on how sectors such as secondary schools may take learning to another level through the smartphone use as a m-learning tool. The educational industry secondary level particularly in South Africa that lacks behind in implementing smartphones use as a tool for learning (Chisango and Marongwe, 2020). Whereas other industries are already far away on smartphones use to reach their customers. This device comes with many features and apps to be downloaded and which can be used to support learners' creativity and long-life learning. For example, these features include, search engines which easily support discovery of new knowledge, quick referencing and information search (Bulus (2020); Peter et al., 2013). The advantages of using smartphones include; providing students and instructors with up-to-date content, better classroom management and data recording, effective collaboration between students, educators, and experts around the world, training for publishing and presenting new knowledge and learning that is relevant with authentic assessment.

2.4.6 Integration of smartphones and other mobile technologies in secondary education

In order for staff to adopt the new technology, their perceptions, attitudes and needs towards the integration of the new technology in the organisation must be understood and explored. The use of mobile technology devices in the secondary schools setting present tremendous opportunities for educators to deliver teaching and learning in a more collaborative and

informative manner. Most users of mobile technologies devices experience an addictive behavior that lead to the users to be so attached to their devices. Nuuyoma, Mhlope, and Chihiruru (2020), Perry, Hutchinson, and Thauberger (2007) revealed that more than 50% of university students spend their time using mobile devices for chatting, sending messages, and browsing the internet. The addictive behavior to mobile technologies use should be directed correctly to learners learning by secondary schools' educators as m-learning tools in assisting learners to improve their performance.

The integration of smartphones in secondary education requires educators that are prepared, trained and determined to use smartphones as m-learning tools. With this type of attitude from the educators' learners can be easily influenced to learn and use smartphones as m-learning tools in schools. There has been little support on smartphone use in teaching and learning process which has to be provided through professional development for educators in using smartphones as m-learning tools. One of the rank of key implementation factor in project RED is that principals are to be trained via short courses in teacher buy-in, best practices and technology transformed learning (Moodley at al., (2020).

Increased time on task is one factor that leads to increased student achievement, smartphone use in secondary schools will increase time on tasks for learners to do their educational activities even outside classroom. However, majority of schools in South African prohibits mobile devices use during school hours. Empirical evidence indicates that if smartphones are used as m-learning tools in schools' teachers and learners will spend more time on school's tasks and activities (Moodley, et al., 2020). One of the more difficult rules to negotiate in schools is that of appropriate use of technological devices, particularly mobile devices such as cell phones, smartphones and "wired" mp3 devices (Nikolopoulou, 2020). Often times schools ban the use of smartphones as learning tools in South Africa because they view them as destructive devices. However, Hadad, Meishar, and Blau (2020), explain that opportunities for

learning are bound and directed by adults, who assign, structure, choose tools and champion for, and manage those activities. M-learning for secondary schools suggest that communities, educators and schools should develop activities and methodologies to permit learners to use these tools through structured, monitored, and explicit instruction (Bulus, 2020).

Bulus (2020), argues that smartphones need educational applications to be fully use as learning tools in the classroom. As mobile devices become a permanent part of our culture, schools must adjust their policies in order to stay current. It all depends on how the schools approaches the IT policy regarding how smartphones should be used. Unless schools' policy makers become more pro-active in changing their perceptions about the usefulness of smartphones, they will never realise they academic potential. The most important aspect is mobile internet access that allows smartphones to provide instant, easy access to the internet. The internet has become an invaluable education tool in providing the everyday person with unlimited information on-demand. Additionally, by allowing learners to use their smartphones for learning purposes, schools can save money on computer labs.

Chatterjee et al., (2020), assert that mobile phones are part of this generations culture getting a mobile phone is considered as teenagers' rite of passage, of the magnitude once reserved for getting a driver's license. Black-Fuller (2016), present findings form one of the high schools in the USA regarding experienced teachers' beliefs and perceptions about integrating smartphones in their teaching. The findings revealed that majority of 73% allowed students to use smartphones and cell phones in the classroom for searching information taking pictures and downloading music and videos related to the teaching while 27% were non-users of these devices in the classroom (Black-Fuller, 2016). Furthermore, revealed that teachers felt unprepared to incorporate smartphones in teaching their specialised fields, so the study suggested a staff development for educators' preparedness to incorporate smartphones in their specialised fields (Black-Fuller, 2016). Mutambara and Bayaga (2020), are of the view that it's

still a challenge to persuade schools and teachers to allow learners to use their smartphones as m-learning tools on schools. Hence, in-service teachers and the schools have an unclear stance on what is required to incorporate these devices in schools as m-learning tools. Hence, Moodley et al., (2020), asserts that it is incumbent on instructors, and the designers of the classroom environment to adapt to these technologies in as far as possible delivering lessons in a way that reflects the use and usefulness of these technologies in teaching and learning. Furthermore, there is a lack of research on the role of in-service teachers in promoting and adopting mobile technologies in the classroom (Black-Fuller, 2016). Hence, this research is conducted with in-service teachers, SMT and principals in understanding their needs in promoting and incorporating smartphones use in schools as m-learning tools. Whereas (Pozas & Letzel, 2021, Thomas & O'Bannon, 2013) stipulated that pre-service teachers in their teaching training programs require teacher training programs that transcends learning of technology skills and knowledge focus on pedagogical beliefs and attitude of teachers.

2.4.7 Challenges of smartphone use in education

The adoption and acceptance of mobile technologies such as smartphones poses much challenges in the entire educational personnel including principals, teachers, parents and learners. However, the most challenged personnel are teachers who are responsible for the delivering of teaching and learning using these mobile technologies. Hence there is insufficient empirical evidence regarding teachers m-learning readiness, so the readiness of teachers to introduce and adopt m-learning in necessary for investigation from multiple-dimensional perspective. Hermanto and Srimulyani (2021), opines that teachers as most critical intellectual resources of schools are facing various types of challenges that are financial, physical and mental challenging. These challenges may include cost of buying data bundles, physical and mental readiness to use mobile devices as m-learning tools in schools. Therefore, the study targeted SMT members and teachers to determine and understand their perceptions on

smartphones use as m-learning tools in secondary schools. Other critical challenges faced by secondary schools on mobile technologies adoption includes the teachers mastering of the technical and technological skills required to deliver online learning using schools LMS (Hermanto & Srimulyani, 2021). However, the availability and ownership of smartphones and tablets by teachers and learners eliminates the challenge of mobile devices require to practice m-learning or online learning by secondary schools. Chisango and Marongwe (2021), revealed that other challenges facing majority of secondary schools in using ICT in teaching and learning is the inadequacy of ICT that creates digital, information, and knowledge in schools these ICT includes access to internet, and technological infrastructure that support teaching and learning away from schools. The reason maybe that most secondary schools in South Africa are located in townships and rural areas. Therefore, safety majors are inadequate to prevent the crimes of theft and stealing of these required ICT infrastructures. The understanding of the challenges faced on m-learning adoption in secondary schools may be determined by the location of the schools and the socio-economic factors of their surrounding communities especially in African the context.

2.4.8 Advantages and disadvantages of smartphone use in education

The domination of smartphones as the mostly manufactured and shipped technological device in the 21st century indicates that in no time smartphones use as working and operational tools in organizations is a need. This implies that there are more advantages then disadvantages of integrating smartphones as working tools in industries either education, hospitality, health and businesses. Godwin-Jones (2017), states that devices such as smartphones offers a smart learning environment that includes innovative features and capabilities as smart hardware's. They use a software that assist in improving understanding and performance, and promotes engagement, effectiveness and efficiency (Godwin-Jones, 2017). This implies that SMT members and educators' acceptance and adoption of smartphones as m-learning would also

benefit learners learning through the use of the devices that they usually using for their personal activities. Devices such as smartphones are portable, small, and affordable, possible in gaming context, improve learning and they enhance and engage learners anytime, anywhere (Godwin-Jones, 2017). Mobile devices use in education strengthen corporative learning, collaboration, and improve personalised and self-directed learning, provides vast teaching and learning potential due to their built in capabilities such as cameras, audio recorders, navigation GPS and maps and it has to function as a helpful tool to educators and learners learning (Godwin-Jones, 2017). These capabilities and futures of the smartphones are similar to the ones found in PCs and laptops which are the most technology used in education while the smartphone is excluded ins secondary schools. However, Godwin-Jones, (2017) reflected on the challenges of using mobile devices as disadvantages of these technologies in education such as teacher training in ICT, digital content implementation, user self-efficacy, and technology addiction fear. These mobile technological devices are self-assisting in that learners acquire more information on their own through m-learning using the smartphones, learning without teacher and parents' assistance.

The most notably benefit of the smartphone use in education is the support it gives to online learning. Online learning practice requires smartphones or tablets because learning takes place outside the classroom context. Therefore, Hermanto & Srimulyani, (2021) stated the following advantages of online learning using mobile devices: access to expertise, networking opportunities, flexibility, reduce cost, and increased students time, also disadvantages such as: inability to focus on the screen, technological issues, and learning is considered to be normal part of working and personal life. Kaliisa and Picard, (2017) state that it is the poor infrastructure that contributes as a major obstacle in developing countries for ICT integration in schools.

2.5 ROLES OF SECONDARY SCHOOLS STAKEHOLDERS IN PROMOTING MOBILE TECHNOLOGIES AS M-LEARNING TOOLS

2.5.1. The roles of stakeholders in promoting smartphones use in secondary schools.

According the ICT Policy for Secondary schools, there are educational stakeholders that are mandated by government educational ministries in the South African context to promote and motivate technology integration to secondary schools for the betterment of learners learning (Department of Education, Republic of South Africa, 2004). However, there have been also many challenges in realising that mandate, the challenges include infrastructure, resources, teacher training in using the required technology and many more. These stakeholders have brought initiatives in supporting technology integration in secondary schools but majority of those initiatives have showed no results. Furthermore, the researcher's observations is that in some secondary schools, the usage of technological devices is still restricted and thus are not part of the teaching and learning process in schools. One notable trend is that smartphones are used by Higher Education institutions in supporting m-learning. However, it is not clear how secondary schools use smartphones as m-learning tools. In defense of smartphone usage David Millar principal of Norman Henhilwood High principal said "they must not be seen as a curse, but as an opportunity for improved learning and exploration. Furthermore, my school sees the smartphone as an amazing tool for use in classroom to enhance teaching and learning (Parents24, 2013:2)".

However, Liu (2020), state that mobile learning has been minimally used in some education sectors, hence there is a need to conceptualise mobile learning from the learner's perspective rather than only looking at the affordances of mobile tools. It should be noted that most ICT policies, particularly in South African context do not allow any use of smartphones in secondary schools. This would cater for the needs of the schools and learners who are so attached to their smartphones (Bakon & Hassan, 2013) for engaging in m- learning.

Additionally, smartphones provide applications that allow the user to create and engage learning through computer activities supported by the smartphone. However, Hamutoglu and Basarmak (2020), indicate that educators' resistance to technology use plays a major part in educator's acceptance or not accepting technology use in schools. Hadad, Meishar-Tal, Blau (2020), argue that the organisational change in schools caused by technology integration could be promoted by the communities and the need to increase resources in schools. Studies like that of Ramsa, 2020; Marunevich, Kolmakova, Odaruyk and Shalkov 2021, reveal that in countries like South Africa and Malaysia m-learning is more promoted and implemented mainly in HE institutions, while secondary education institutions are neglected. The researcher is of the idea that the smartphone use promotes borderless education, so even secondary education institutions can benefit.

One of the commonly used policies for promoting mobile learning is the "Bring Your Own Device" (BYOD) (Chen, Li and Yin, 2020). Moreover, the provision of a more solid framework for m-learning existence and practice in secondary schools using the smartphone is required.

2.5.2. Roles of SMTs in secondary schools for technology use.

One of the governance structures in South African schools is called the School Management Team (SMT). This is the structure which can play a vital role in the development and integration of ICT use in schools, as one of its mandate is to improve teaching and learning in schools and that can be achieved through the use of technology. However, most decision made for using information technology learning platforms in secondary schools are made without proper assessment of SMT members and teachers acceptance and use of technology. The education and training system should create an environment where teachers and SMT members are expected to utilise ICT for teaching, administrative purposes and for supporting e-learning as a standards learning method (Mookesti, 2020). The author, also suggest that, one member

of the SMT has to be the manager of Information Technology use in secondary schools to support teachers' integration of smartphones as m-learning tools. The author furthermore, argues that what may also lead to teachers' resistance to technology use is the lack of guidelines from the SMT which support them to integrate technology in the teaching and learning process. Other critical issues that might be looked into is the lack of infrastructure (Management information Systems) and human resources (SMT member with technical skills on technology use in teaching and learning). Thannimalai and Raman (2018), state that SMT members in a democratic country are entrusted with the authority and responsibility to formulate and adopt school policies on the range of issues. Based on those policy issues, the National ICT policy encourages SMT members to formulate and adopt structures that support ICT use in developing effective teaching and learning. Botswana has a policy document wherein it is stated why and how teachers, school heads, schools' IT managers and teachers ought to be trained (Mooketsi, 2020).

The role of the SMT members is to adopt smartphone use as m-learning tools to improve learner performance in secondary schools. In Chile over 60% of SMT members' priorities ICT infrastructural related issues such as internet connectedness, bandwidth and availability of digital resources (Blignaut, Hinostroza, Els, and Brun, 2010). In the study conducted by Chatterjee et al., (2020), learners in secondary schools found it necessary to adopt mobile education via mobile phones, but, it also depends on the policy makers to support mobile education. The authors suggest that these policies should be strictly on what can be accessed and when. However, in the South African context secondary schools SMT members and educators seems to lack behind in finding ways of accepting, using and promoting mobile technologies as rightful tools for teaching and learning (Moodley, et al., 2020).

Thannimalai and Raman (2018), state that any engagement in innovation and professional development in schools are to be led by the school senior management, as they need to support

and enhance innovations that promote effective teaching and learning. SMT members in a school are viewed the originators and managers of change and development within the schools (Muijs and Harris, 2006). While empirical studies on smartphone use in educational context exist with substantial literature in developed countries and urban schools (Moodley et al., 2020), however, empirical studies on smartphone use as a m-learning tool are rare in developing countries and secondary schools.

Since SMT members and educators are mandated by the Department of Basic Education (DBE) to make decisions that allows technology integration in teaching and learning to promote the culture of digitalization. Senior managers have an important role in determining the failure or success of technology implementation in any organisations (Thannimalai and Raman, 2018, Stuart, Mills and Remus, 2009). In addition, the National Policy of ICT use in schools supports secondary schools' context and it also looks at how does the policy position smartphone use in secondary schools. They are replacing books, magazines, newspapers and maps (Gozum, Erkul, & Aksoy, 2020; Rodrigues, 2011). Therefore, managers of today's knowledge where smartphone technology is part of the business tools are benefiting from the ubiquitous nature of the device. Schools books and other learning materials can always be at a finger tips of the students if the smartphones device can be part of the secondary schools' curriculum as a tool for m-learning.

The most important activity for school managers is to manage teaching and learning, they have to provide and/or allow sufficient and suitable learning material to develop effective teaching and learning in schools (Thannimalai & Raman, 2018). One of the ways in which that can be done is through the adoption of smartphone as a tool for teaching and learning. The study by Osakwe et al., (2016), revealed that teachers and students believe that schools need policies to be in place for m-learning to be implemented. As is it in Namibia, South Africa has less evidence and information on how smartphones can be adopted in schools, and how can the SMT members influence the adoption of m-learning in our secondary schools. Therefore, smartphone adoption should be seen as the gateway in the lack of infrastructure and technological resources to support teaching and learning in schools, and to bridge the "digital divide" between urban and rural secondary education. Malaquias and Silva (2020), Peters (2007) observe that mobile technologies are commonly used in commercial sectors and not so much as a learning and teaching tool in schools.

2.5.3 Teacher-learner relationship for m-learning.

Classrooms today are associated with significant changes because of technological developments. shifting and changing the roles of the teachers and students in learning (Chatterjee et al., 2020, Mumtaz, 2000). The authors further assert that the role of teachers has changed from that of directors of student-focused activities to those of as managers and supporters, especially with the assistance of IT. The study by Kafyulilo, Fisser and Voogt, (2016) state that the encouragement of school management to understand and develop strategies to integrate technology in teaching and learning was a critical factor in teachers' continuation of technology use. Research by Moodley, et al., (2020) indicate that educators who are regular users of ICT showed confidence, and the usefulness of ICT in their teaching and, they also indicated the willingness to extend its use in the future.

However, there are factors that encourage the use of technology in schools which needs to be understood in order to infuse more technological hardware and software applications to promote technology use in schools. Most of the youth is fascinated by the use of smartphones in social practice which leads to them being more focused to it, than focusing on the school work. Therefore, this implies that the adoption, use, of smartphone technology could promote m-learning. Chatterjee, et al., (2020), Mumtaz (2000) found that technology use in schools has some advantages, such as that the teaching of lesson become interesting, and funny and learners become motivated and they enjoy their lessons. Therefore, educators use of technology motivates and makes learners learning more interesting but it's all starts with the educators' willingness to try use the technology. Moodley, et al., (2020); Mumtaz (2000), indicate that the most of factors that are important in technology use in schools are the ones of educators which are based on their beliefs about what should be in the content and the way the subject should be taught using the technology.

There are many challenges that hamper technology use in schools, they include, ease of use and Effectiveness of the technology in use to support teaching and learning (Kafyulilo, Fisser & Voogt, 2016) the lack of technological tools (Chatterjee, et al., 2020) and inadequate ICT (Chisango and Marongwe, 2021). , In their findings Kafyulilo, Fisser and Voogt, (2016) , found that even in schools with technological tools, the lack of support and motivation from the school management team and educators who never used technology in teaching causes challenges.

2.5.4 Perceptions of educators on the use of smartphones as m-learning tools.

In gaining and transferring 21st century technological skills to learners', teachers need to be competent in the world of ICT. They require upgraded knowledge and skills so as to use mobile technologies successfully as m-learning tools in schools. Thannimalai and Raman (2018), argue that productivity of the staff will be significantly enhanced if the principal can strive to

develop themselves on ICT use along the line of their duties. Similary, Ebunu (2019) highlight the importance of specialized training for principals to equip them with skills and knowledge to perform their duties efficiently. In the same vein, Thannimalai and Raman (2018), Raman, Don and Kasim (2014) opines that principals plays a vital role to ensure technology integration in schools according to their government mission. This implies that SMT members and teachers in this changing environment of technology use, need capacity building programmes to adapt to the changing ways of teaching and learning in the 21st century. Evidently, it is clear that principals and SMTs members can be a driving factor in successful technology use by teachers and learners. Therefore, principals' technological knowledge and skills are considered valuable investment for the schools' growth (Raman, Don & Kasim, 2014).

2.5.5 Teacher development in using mobile technologies and preparation of mobile the curriculum

In the 21st century it is imperative for educators to be prepared for teaching and learning of the type of learners they find in their classrooms. The 21st century youth is referred to as digital natives; as they believe in the technology and use it for most part of their lives (Moodley, et al., 2020). They carry these mobile devices all day and night so they are attached to them. Students have shown the desire to use mobile devices for learning, while personal ownership is growing (Nikolopoulou, 2020). Therefore, this implies that educators in the 21st century need to embrace mobile technologies use or m-learning possibilities in their schools so as to support and promote learning using mobile technologies. The growth of the access to these devices makes them to be found in all corners of schools premises from the learner's pockets, hands, to teachers' hand bags, desks either on social media or surfing the internet (Mutambara & Bayaga 2020). Access to mobile learning technologies enables teachers to create experiences that are relevant to their learners personalised and differentiated learning, with the possibility of dramatically increasing student engagement (Nikolopoulou (2020), Foulger, et al., (2013)

In the teacher education programmes mobile technology use as learning tools have not been adequately studied especially in developing communities where the growth and access to mobile technologies is growing at a faster pace. Pre-service teachers when asked about their ultimate preferable tools for teaching and learning in secondary schools they prefer the use of mobile learning tools than traditional computer-based technologies (Foulger et al., 2013).

In most European schools, administrators point out that when they hire new faculty, they look for specific qualities relating to teachers who are capable of effectively using mobile technologies in their classrooms (Oikonomou & Kaimara, 2018; Project Tomorrow, 2012). Due to the proliferation of mobile devices, both educators and leaners have the ability to personally access information using mobile technology anytime and anywhere (Bulus, 2020, Foulger et al., 2013). Unlike in the past where technologies used for teaching and learning were time and place bound, the smartphone makes it easier for learning to happen anywhere.

There is a potential of the curriculum to be adjusted for the sake of preparing teachers and pre-services teachers to use mobile technologies as learning tools in secondary schools. Therefore, tailor making teacher education programmes and curriculum into the mobile technologies use will also benefit the schools to meet the demands of the 21st century learners who are technological attached and driven. There are various stages to be undertaken to reach the full potential of smartphone use as m-learning, for instance, teacher education institutions need to design methods of teaching and learning suitable for the classroom context. However, (Moodley et al., (2020), indicate that while some educators are experimenting with how to integrate these tools, others have put the idea on hold or rejected it altogether.

Mobile learning research in schools' curriculum is relatively limited and most teachers lack clarity on the roles of mobile learning tools in the delivery of the curriculum in secondary schools. Nikolopoulou, Gialamas, and Lavidas, (2020) regards the curriculum as the external

factor in hindering the acceptance and use of m-learning in secondary schools. While France et al., (2021), opines that pathways for instructors to address the pedagogical and technological considerations of incorporating m-learning into the curriculum is of necessity in the 21st century. However, the majority of countries educational systems around the world shows concerns on bringing improvements on the use of mobile technologies to educate leaners in schools (Moodley, et al., 2020). Therefore, schools' management has to find ways in promoting and enhancing learners use of mobile technologies as m-learning tools in schools. For instance, provide a conducive environment in the schools' premises where learners can access learning using mobile technologies. Nikolopoulou (2020), Ally (2013) opine that both teachers and learners need training on the use of mobile technologies to design learning materials and access learning materials. The researcher point of view is that these required trainings has to be given to both teachers and learners so that they can take full possibility of mobile technologies use in schools.

Smartphones functions at multiple levels. Bulus (2020), El-Hussein and Cronje (2010), highlights that smartphones and other mobile technologies devices advancements are giving visionary educators, designers and developers to rethink implications of these devices for the modern teaching and learning environment. As an educational activity, mobile learning makes sense only when the technology in use is fully mobile, and when the users of the technology are also mobile while they learn (Qashou, 2020; El-Hussein & Cronje, 2010). Research and reflections on mobile learning should stimulate multidisciplinary and interdisciplinary thinking and methods in education. Mobile learning opens our minds to the possibility of a radically new paradigm and encourages people to abandon the constraints of their habitual thinking, learning, communicating, designing, and reacting (Chatterjee et al., 2020). Mobile devices by new technology designers and manufacturers are regarded as potent tools to replace computers

in delivering successful, entertaining and long-life learning (Bulus, 2020). Memon et al., (2020); El-Hussein and Cronje (2010), anticipated radical changes in every structure of educational dynamics because of the extraordinary potential inherent in mobile devices and their use in the society.

2.5.6 Principals as managers of secondary schools.

Schools as organisations trust educators to lead the developments of teaching and learning through technology use. In ensuring that organisations continue to fulfil its proper function leaders needs to be a step ahead of two new developments and responsibilities (Ebunu, 2019, Mumtaz, 2000). According to Abdulkadir et al., (2021), the Learner-Centred Design (LCD)'s main attention is on designing learning environments that enhance an understanding of social contexts of learning and capitalising on the use of modern ICTs devices based on how students communicate and interact. The LCD methodology gives particular attention to the need to integrate private use of smartphones into public learning settings. The Participatory Design (PD) in the product use is seen as a demand in a specific context of development, involving the users, designers working together to exchange perspectives, learning about each other's skills and values together identifying the most suitable set of requirements. The LCD was developed as a possible choice for user-centred design (UCD). The LCD moves beyond usability issues to the challenge of developing computer systems that support people in the learning environment, developing high levels of knowledge and skills in work practices that are new and unknown. The adoption and use of mobile devices as teaching and learning tools in educational institutions supports the relationship between LCD, PD and UCD. Smartphones creates a learning environment that allows LCD learning and engagement in teaching and learning, understanding and engaging with learning material which influences the PD and engagement of a learner in his/her learning activities because the smartphone use in teaching and learning promotes UCD on learning activities, information search, and problem solving.

There is a gap in the literature especially in the South African context on what role should the SMT members and educators play in promoting the utilization of smartphones as m-learning tools in secondary schools. However, the roles of the managers / principals in schools is to initiate, develop and monitor any technological develops in secondary schools teaching and learning and priorities learners learning using technologies. Therefore, the crux of this study firstly was to understand the needs of the SMT members and educators from the DBE to support and assist in developing initiatives to use smartphones as m-learning tools in secondary schools. Secondly, to develop a model to assist both DBE officials and SMT members in secondary schools to designing and develop initiatives of using smartphones as m-learning tools in secondary schools. Parveen, et al., (2021), Bush and Oduro (2006) one of the challenges of principal ship in developing countries is that they do not receive proper training for the position which leads to use a try and error method to find solutions and develop their schools. The researcher agrees with the above author; this ill-suit training plays a crucial role in destroying effectiveness of the schools. Therefore, the researcher is of the idea that secondary schools' principals must be trained well especially in technology literacy. Moreover, the world is moving towards digitalisation so we need secondary schools' leaders with digital skills. The researcher believes that it is the main reason why some smartphones are viewed as a distraction in teaching and learning than a potential tool to enhance teaching, it's because of the lack of proper training by the principals. Stuart et al., (2009); Moodley et al., (2020) the literature points it out that schools' principals to have high level competencies in ICT requires training and background to be able to work using technology. However, schools' principals turn to micromanage teachers instead of initiating and leading efforts to collectively monitor students' achievement and improve teaching and learning through professional learning communities (Parveen, et al., (2021), Dunfour and Mattos, 2013).

2.5.7 Factors affecting educators use of technology in schools

There are numerous challenges to be addressed before the mobile technologies use may be successfully implemented in secondary schools to design new structures of teaching and learning using smartphones. The points of departure on these challenges are the factors to be in place to motivate educators to view the smartphones as a tool for teaching and learning in secondary schools.

Chatterjee et al., (2020), suggest that technology use in schools needs to look into the three interlocking frameworks for change and implementation of ICT which are: the teacher, the school and policy makers. However, Moodley et al., (2020) and (Kafyulilo, Fisser and Voogt 2016), state that the most important factors are those related to an individual educator which are knowledge and skills, beliefs, time availability and engagement in the use of technology in teaching. All teacher factors depend on what teachers do and think. There are also factors in schools that hinder educators to use technology in schools such as: lack of their experience in using ICT, lack of in-site support for teachers using technology, lack of ICT specialist teachers to teach students technological skills, lack of time required to successfully integrate technology into the curriculum, lack of financial support (Moodley et al., 2020). However, a teacher who practices and engages in the integration of technology in teaching and learning generally embraces the new possibilities brought by the technology in use and creates new learning experiences for learners (Moodley et al., 2020). There are three themes (Chatterjee et al., 2020, teachers as fearful (fear of the unknown whether they could be able to use mobile application for teaching and learning), teachers as inept (teachers do not have or poses the skills required to use mobile technologies as learning tools), and teachers as less capable than learners (less capable of understanding and using mobile technologies even in person activities while learners are always attached to their mobile devices for personal activities) leading to educators' resistance at working to introduce new technology.

2.5.8 Legislations (Policies): Analysis of the South African policy on ICT use in education.

Mainly the introduction of technology in schools is aimed at improving teachers' quality through using the use technology. It is important that ICT policy is reviewed time to time because of technology frequent changes taking place in the Information Technology arena and how technological advances in a short period of time. Department of Education, Republic of South Africa (2004), digital media revolution and advances in ICTs has affectedly influenced changes in the learning and teaching processes. There has been an increase in the access of resources and it has opened up new opportunities to teaching and learning (Department of Education, Republic of South Africa, 2004). Therefore, schools in South Africa and around the globe are experiencing opportunities of providing teaching and learning beyond the classroom to promote the goal of life-long learning and providing quality of teaching and learning. ICT has the potential to improve the quality of education and training in schools, so the schools need to seize the opportunities presented by the benefits of ICTs to support teaching and learning in the 21st century (Department of Education, Republic of South Africa, 2004). Nevertheless, the deployment of ICTs does not guarantee their efficient utilisation, capacity building and effective support mechanisms must accompany deployment to realise the benefits of ICTs use (Department of Education, Republic of South Africa, 2004).

According to the Gauteng Department of Education (2011) an ICT policy for schools need to be supported by a number of procedures which define the rules, regulations, methods, timing, place and people responsible for the implementation of the policy. Therefore, each public school should develop its own ICT policy that covers curriculum delivery in the school and promote goals of ICT in schools (GDE, 2011). The main aim by most government technology projects in schools is to improve teaching and learning using recent technological innovations

(Osakwe, et al., 2016). Therefore, schools should design mini-policies aligned to their context to promote and enhance teaching and learning using recent technological innovations with the support of the Department of Education. Osakwe et al., (2016) findings indicated that teachers and learners in Namibian secondary schools are mobile literate and there are also mobile technologies who assist during the teaching and learning process. Therefore, the Namibian secondary schools are at an advantage for adopting and implementing smartphone use as a learning tool (Osakwe et al., 2016). In this case, it is clear that schools require leaders who are technological driven to support and enhance learners learning using technological devices especially in the 21st century. The new models of learning such as m-learning are radically changing our concept of education. Therefore, ICT for schools' technology use requires machines, devices, equipment and system that can be used for schools as a media for information and communication purposes this include devices such as cell phones and smartphones (Gauteng Department of Education, 2011). Additionally, the introduction of ICT in schools indicate that the roles of teachers need to be re-defined, as this require new developments of teachers' skills and new ways teaching using ICT. Therefore, the introduction of ICT in schools and development of ICT policies should cater for both urban and rural contexts. In urban communities' ICT use is seen as an opportunity to promote and enhance social and professional developments, while majority of parents in townships and rural secondary schools do not view the smartphone technology use as an opportunity support and promote education (Mutambara & Bayaga, 2020). Hence the smartphones use as an enhancing tool in secondary schools must be dealt with by many stakeholders including the Department of Education, the school management and private partners. However, some challenges are hindering the use of smartphones as an m-learning tool in secondary schools, like the school infrastructure, the prohibition of smartphone in schools and the unavailability of resources, while smartphone access in semi-rural communities is expanding at a faster pace. These

challenges may lead to secondary schools to stay away from developing initiatives of using mobile technologies to develop schools' operations and improve teaching and learning. In avoiding challenges and distractions of using smartphones as m-learning tools in secondary schools' proper rules and guidelines should be established before teaching and teachers and students needs to abide to these rules and guidelines.

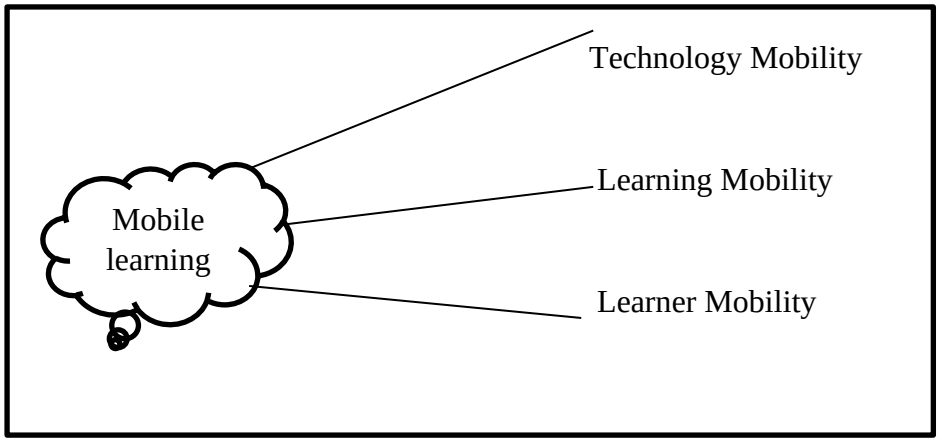
2.6 M-LEARNING IN EDUCATION

2.6.1 Effects of M-learning in education

Studies conducted under m-learning, reveal that using smartphones have been curtailed in secondary schools because they are viewed as disruptive during teaching and learning process (Mutambara and Bayaga 2020, Krevitt, 2013), particularly in South African context. M – learning is defined differently by different authors, some define it in terms mobile devices and technologies (Traxler, 2021, Traxler, 2007), others in terms of learners' mobility in learning (Qashou, 2021; Bilos, Turkalj & Kelic, 2017) and, lastly in terms of the learner's experience of learning using a mobile device (Palalas & Wark, 2020, Bilos et al., 2017).

The advantages of m-learning, include the fact that learning is not restricted to a specific physical environment, a particular delivery channel, or fixed sets of time for undertaking teaching and learning. The research conducted by Bilos et al., (2017) in VET secondary schools in three European countries, revealed that m-learning has a brighter future in secondary education if mobile technologies such as smartphones are properly structured and used to support learners teaching.

Figure 2 reveals three concepts of m-learning which simplifies SMT strategic planning needed to adopt the smartphone as a m-learning tool in secondary schools.



. **Figure 2. Concepts of Mobile Learning**

The three elements or concepts of using a mobile device as a signifier in HE educational landscape Palalas, and Wark (2020), El-Hussein and Cronje (2010), are mobility of technology, mobility of the learner, mobility of learning. The three elements are interdependent and are equally important in making mobile devices viable as tools for the delivery of secondary schools' instructional content. For instance, mobility of technology refers to the mobility of the devices which makes them highly prestigious and therefore desirable as tools of learning among learners in the same group (El-Hussein and Cronje, 2010). The mobility of learner – learning is a learner-centric activity, with more flexibility and personalised learning tasks. Learners who uses mobile technologies for learning are not only remote from their instructors, but, also mobile learning allows them a certain amount of freedom and independence in their learning (El-Hussein and Cronje, 2010). Mobility of learning is the provision of accessible resources for learners in their mobile devices (El-Hussein and Cronje, 2010).

The use of smartphone for m-learning in secondary schools will prepare our secondary education learners when they enroll to online universities (Hermanto and Srimulyani, 2021, Shin and Kong, 2012) as mobile technologies are embraced as learning tools by online

universities and other HE institutions. In the study conducted by Moodley et al., (2020), on the perceptions and experiences of Indonesian teachers, the results revealed that teachers were willing to learn how to use mobile phones for m-learning during their training on ICT use.

Most of e-learning activities for facilitators could be done through using the smartphones or mobile phones to test the knowledge of students, even within the classroom or outside the classroom. (Kadry and Ghazal, 2019, Osakwe et al., 2016). The researcher believes that the combination of the smartphone and the fully connectivity to the internet is a powerful and compelling innovation which easily supports the educational context. Students can use it as a handy field research device, to make notes, take photos, and browse the internet and ready notes. Smartphone technologies enable learners who might otherwise have been excluded to engage in education and offer learners a distinct learning experience. Li, Wang, and Lei (2020) Prensky (2009) state that "today's learners are no more the people our educational system was designed to educate". He further notes that the thinking and mental processing of these learners' is profoundly different from their predecessors, they have developed new learning ways and intellectual practices because of their immense exposure to mobile technology use (Li, Wang and Lei, 2020; Prensky 2009).

One of the main objectives of using m-learning is to reach as many learners as possible (Qashou, 2020; Smarkola, 2011) therefore this type of learning is supported by the use of mobile technologies. This can also solve the problem of learners' participation in larger classes in our secondary schools. Distance learning has brought m-learning into spotlight through the use of mobile technologies, and this has been proven by the success of online business which are more supported via the use of a mobile technology device. Students studying using distance learning mode receives learning content, assessments and assignments with due dates on their mobile devices. Bulus (2020), study illustrates how mobile computing devices enable students to interact with course content, peers, and instructors in a variety of ways via mobile devices.

2.6.2 M-learning in Higher Education

HE institutions are the most educational institutions benefiting from using smartphones as m-learning tools for lecturers and students. Majority of them are using online learning systems such as MOODLE as a Learner Management System (LMS) that allows a quick interaction between the lecturer and the students concern. Lectures are able to upload learning material and conduct teaching and learning via zoom meetings and MS teams. Therefore, easily getting contact and communication with students concerning teaching and learning matters. Many research studies in HE institutions Qashou (2020), Al-Sharhan, (2016), El-Hussein and Cronje (2010), Al-Hunaiyyan, et al., (2016) reported evidence on positive perceptions of lecturers and students about m-learning using mobile devices. Therefore, mobile technologies developments have created an area of developments on how educational institutions can create conducive learning environments to support m-learning. This conducive learning environment supported by the smartphone technology use provides learning institutions with much more learner flexible approaches to manage their learning experiences (Qashou 2020, Al-Hunaiyyan, Alhajri, and Sharhan, 2016). However, it is mostly used in tertiary education. Instructional designers and educators recognize the potential of mobile technologies as a learning tool for students and have incorporated them into the distance learning environment (Polydoros, 2021, Park, 2011). Gozum, Erkul and Aksoy (2020), pre-service teachers can use their smartphones as m-learning tools to make audio or video recordings of their lessons, to browse websites relating their content, access relevant activities and learning materials for their classes.

2.6.3 Advantages and disadvantages of m-learning

Mobile services based on teaching and learning using mobile devices is defined in terms of the learning content and the hardware in use, for the purpose of this research the hardware is the smartphone. These services provide learning that is easily supported and delivered mainly by handheld and mobile devices such as smartphones, PDA's tablets PC's (Traxler, 2021, 2007).

Juric, Bakaric, and Matetic, (2021), cite some of the common m-learning advantages. For instance, m-learning provides seamless access to learning resources as it allows learners to study anywhere, either in a classroom or on a smartphone or laptop. It also gives learners freedom, power, and choice, learners who study through m-learning which enables students to select when, where, and how they study. These options include online synchronous learning, online self-paced learning, computer based learning, and downloaded courseware. It offers potentially more rewarding learning experiences. It improves levels of literacy, numeracy, and participation in education amongst young adults and youth. It does not matter where the learner is, which mode of instruction or delivery method he or she is using, or how much time they have available for training or education. Using the latest technology, learners can update their knowledge based on a just-in-time basis to prepare for meetings or presentations. It also offers inexpensive opportunities, as the cost and types of mobile devices significantly less then PC's and laptops but more developments are featured.

Table 2 represents different m-learnig theories, their definitiions, focus areas and the example of the mobile technology useful for each theory. This table alludes to the benefits of different theories secondary schools can benefit from if m-learning is implemented in their teaching and learning.

Table 2. Mobile learning theories (Mahmoudi 2020, Keskin and Metcalf, 2011)

2

Theories	Definitions	Focus	Examples with mobile technology
Behaviorist Learning	Learning has occurred when learners evidence the appropriate reinforcement of an association between a particular response and stimulus	Information and content delivery in mobile learning Language learning: test, practices, quiz, listening-practice speaking	English learning applications SMS, MMS, Voice recorder software Mobile Response System: Qwizdom, Turning Point Response System

		Drill and feedback: Mobile Response System Content delivery by text messages	tell me tech. (searching)
Cognitivist Learning	Learning is the acquisition or reorganization of cognitive structures through which human process and store information	Information and content delivery in mobile learning Using Multimedia learning (Dual code, Cognitive Load Theory): images, audio, video, text, animations	Multimedia (text, video, animation, images) SMS, MMS, e-Mail, Podcasting, Mobile TV
Constructive Learning	Learning is an activity process in which learners construct new idea or concepts based on their current and past knowledge	Context and Content dependent mobile learning Questions for Exploration Cases and examples Problem solved and Decision Making applications Multiple representations Authentic contexts based information database Collaboration and interaction in mobile learning Collaboration and interaction between students communication via mobile phones	Handheld games Simulation Virtual reality Interactive Podcasting and SMS Interactive mobile TV and SMS
Situated Learning	Learning is not merely the acquisition of knowledge by individuals, but instead a process of social participation	Social Context and Social participant dependent mobile learning Authentic domain activity Collaborative social interaction Cooperative activities Expert Modeling Situated monitoring Workplace learning	Natural science learning Medical education Multimedia museum Virtual experts by artificial intelligence tech. Mobile performance support system

Problem-based Learning	Learning aims at developing students critical thinking skills by giving them an ill-defined problem that is reflective of what they will encounter as a practicing professional	Problem-based context and solve based content-dependent mobile learning Problems – Solutions Case centered activities Collaborative social interaction	Medical education Business Administration Nursing Simulations SMS MMS Voice respond systems
Context Awareness Learning	Context awareness means gathering information from the environment to provide a measure of what is current going on around users and the device	Context aware in mobile learning Context-dependent content management Contextual event notification Context-aware communication Navigation and retrieval of learning materials User interface adapted according to time and location contexts	Multimedia museum and gallery Pre-class podcast Films e-books podcasting
Social cultural theory	Learning occurs first through interpersonal (interaction with social environment) then intrapersonal (internalization)	Social Context and Social participant dependent mobile learning Mobile experts Community of practice Workplace learning Mobile communication	Mobile performance support system Virtual experts Mobile forum, E-Mail Social network (web 2.0 tools)
Collaborative Learning	Learning is promoted, facilitated and enhanced by interaction and collaborations between students.	Collaboration and interaction dependent mobile learning Active participation Social context Communication between peers via mobile phones	Mobile Assisted Language Learning Mobile Response System Mobile computer supported collaborative learning Forum, web 2.0 tools, e-mails, portal, games
Conversational Learning	Learning is in terms of conversations between different	Interaction and communication	Laboratory classes Field trip

	systems of knowledge	dependent mobile learning Solving a problem Exploring an environment Communication between peers via mobile phones	Mobile computer supported collaborative learning Calling, Interactive Voice Respond (IVR)

2.6.4 International context of m-learning for secondary schools.

The integration of technological mobiles in education is mostly done to improve the level of resources access and information sharing especially for under resourced teaching and learning institutions. The use of mobile phones in education has changed how teaching and learning is unfolding in the 21st century. The main aim of educational institutions to use mobile technologies is to support learning processes and improve quality in education (Drossel, Eickelmann and Gerik, 2017). The authors further state that there is still a challenge in schools for educators to promote learners' skills and their preparation for life through the smartphone technology use in teaching and learning. However, Can, Kucuk, and Simsek (2020) state that m-learning has some limitations that results in it being not fully implemented even in developed countries such as Turkey these limitations include sustainable integration into formal educational context, teacher support and training, lack of theoretical and pedagogical underpinning. Research shows that European learning institutions provide applications of mobile learning ranging widely, from K–12 to higher education and corporate learning settings, from formal and informal learning to classroom learning, distance learning, and field study (Can, Kucuk, & Simsek, 2020). However, the authors further note that although mobile learning continues to offer more services, it remains an immature technology due to its technological constraints and pedagogical limitations. This suggests that mobile learning in secondary schools requires a solid theoretical foundation as well as guidance in how to utilise emerging mobile technologies and incorporate them into the teaching and learning process.

Ndume, Songoro and Kisanga (2020), argues that as much as we are living in the 21st century there is still limited understanding of how m-learning could be promoted and used to enrich mathematics performance in African secondary schools. This might mean that there is a lack of understanding and exploring ways of how m-learning could be embedded in our secondary schools.

2.6.5 Sub-Sahari African and African continental m-learning context for secondary schools

One of the reasons why m-learning has a slower uptake in developing countries is the un readiness and fear of unknown of using mobile technologies in education. However, through the advance development of mobile technologies there is a great potential in developing and bringing more educational opportunities in the secondary educational especially in the context developing countries. Research studies of m-learning in African secondary schools have been minimal, hence, the current study. It is because of its interactivity and convenience that e-learning is a key factor in enhancing teaching and learning (Marandu, Makudza, & Ngwenya, 2019).

According to Mutambara and Bayaga (2020), resources are needed to successfully provide secondary schools teaching and learning of mathematics through m-learning in rural areas. Developing countries have been receiving relatively low attention in the acceptance and use of mobile technologies in teaching and learning institutions, unlike in developed countries (Marandu, Makudza, & Ngwenya, 2019). Therefore, for African countries, this suggests that there is still much of research required to fully understand the acceptance and use of mobile technologies in teaching and learning especially in secondary schools. Even though globally the number of computers in schools has increased, technology acceptance and use in the classroom and learning remains relatively low (Perienen, 2020, Holden, Ozok, & Rada, 2008).

According to Roberts and Spencer-Smith (2019), state that there has been minimal research on the Southern Africa context to use m-learning as a potential supporting strategy to promote and support quality teaching. Therefore, the South African context of m-learning needs more research on understanding and promoting m-learning as a teaching and learning strategy in secondary schools' classrooms and their homes. There need to be focus on teachers, especially their instructional practice and abilities so as to deal with contextual realities to improve the lives of children (Roberts & Spencer-Smith, 2019:1).

2.6.6 South African secondary schools m-learning practice and context.

As of the previous year's, m-learning has been seen as the driving factor for both Higher Education and Secondary Education teaching and learning because of changes that technology has brought in our educational sphere and life at large (Roberts & Spencer-Smith, 2019). Therefore, it is educational advocates to understand, explore and determine ways of infusing m-learning in all levels of teaching and learning, so as to provide quality education and long-life learning for both learners and teachers. Moodley, et al., (2020), suggest that for teachers to be able to use mobile technologies use in the classroom they need to be trained, and have access to infrastructure, and resources. Additionally, Mutambara and Bayaga (2020), state that the adoption of m-learning and use of mobile technologies as tools depends deeply on the user acceptance. The authors, further, suggest ways that can promote the use of smartphones as m learning tools in schools, those include the fact that DBE should provide needed resources such as tablets and initiates partnerships with cellular network providers to allow some educational platforms and websites to be accessed freely. In the same vein, Moodley, et, al. (2020), asserts that the implementation of m-learning and its processes requires continuous support and commitment from all stakeholders of the school as an entity. However, Mutambara and Bayaga (2020) caution that all stakeholders' attitudes need to be investigated to realise the goals of implementing m-learning for secondary schools in developing countries. Therefore, it is

important that principals, educators, leaners and the Department of Education officials need to play a role in supporting and enhancing m-learning integration in secondary schools using smartphones. In the South African context there are, however, different small scale initiatives and projects aiming at promoting m-learning in secondary schools this includes, and they include MobiLED, MoLeNET, MOBILEARN, ICT4RED and Gauteng online. Additionally, the DoE has been encouraged to implement mobile technology and develop policy documents that guides and support teachers (Moodley et, al. 2020)

2.7 EXISTING MODELS AND FRAMEWORKS IN PROMOTING SMARTPHONE USE AS M-LEARNING TOOL

2.7.1 Technology Pedagogical Content Knowledge framework (TPACK).

The Technology Pedagogical Content Knowledge framework **(**TPACK), is one of the models mostly used to integrate online teaching and learning which has yielded some significant results on the acceptance of m-learning use in education, hence online teaching is possible through the smartphone use. However, smartphone technology uses as a m-learning tools must be accepted especially by the educators before it is infused into pedagogical knowledge as a tool for teaching in secondary schools. Pedagogical Content Knowledge (PCK) is the intersection and interaction of pedagogy and content knowledge (Kainat, et al., 2021). While, Technological Pedagogical Knowledge (TPK). is an understanding of how teaching and learning change when particular technologies are used (Kainat et al., 2021)? Developing TPK requires an understanding of the potential benefits and limitations of particular technologies, as well as the educational contexts within which these technologically supported activities function best.

Technological Content Knowledge (TCK), entails an understanding of the manner in which technology and content influence and constrain one another (Kainat, et al., 2021). The problem is that usually when planning for instruction, content and technology are often considered separately. Technological Pedagogical Content Knowledge (TPACK) is distinct from

knowledge of its individual components and their intersections. TPACK includes understanding and communicating representations of concepts using technologies, practicing pedagogical methods that apply technology in a differentiated manner according to students' needs. It also entails knowledge of what makes concepts difficult or easy to learn and how technology can help redress conceptual challenges. Furthermore, TPACK is about the knowledge of students' prior content-related understanding and epistemological assumptions, along with related technological expertise or lack thereof.

Figure 3 represents the TPACK framework which is about the knowledge of how technologies can be used to build on existing understanding to help students develop new epistemologies or strengthen old ones. In summary, TPACK is a form of professional knowledge that technologically and pedagogically adept curriculum-oriented teachers use when they teach. Below is the diagrammatic representation of TPACK Framework and its knowledge components.

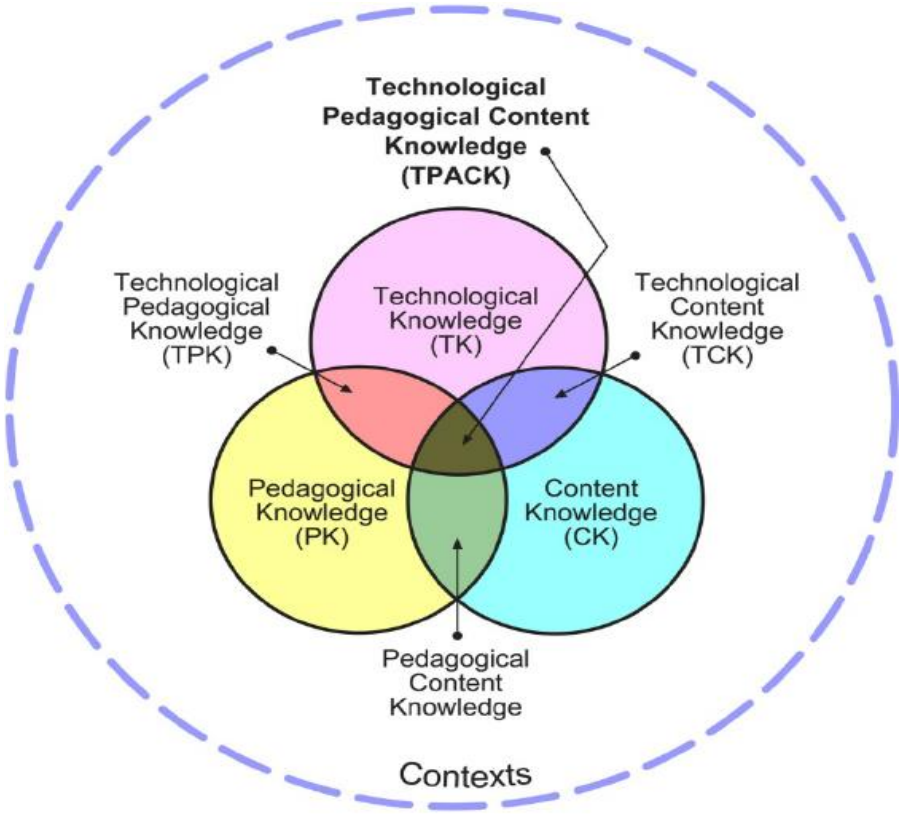


Figure 3. TPACK Framework and its knowledge components (Mishra and Koehler, 2009)

The point of departure in the designing of the TPACK model is testing the conceptualisation and support of educational technologies use in the classroom as tools to enhance teaching and learning. Mishra and Koehler, 2006; Koehler and Mishra 2008 suggested TPACK as a framework to understand teachers' knowledge required for effective technology integration. TPACK emphasises the connections among technologies, curriculum content, and specific pedagogical approaches. It also demonstrates how teachers' understandings of technology, pedagogy, and content can interact with the teacher to produce effective discipline-based teaching. Mishra and Koehler (2009) states that this framework requires three interdependent variables of teachers' knowledge, firstly, content knowledge (CK), secondly, pedagogical knowledge (PK,) an, lastly, technological knowledge (TK).

2.7.2 SAMR Model

Substitution, Augmentation, Modification, Redefinition Model (SAMR) model is one of the frameworks designed to test m-learning practice using mobile devices. Therefore, the model can be used to significantly determine the adoption of technology by teachers in secondary schools (Wahyuni, Mujiyanto, & Fitriati, 2019). Educators and instructional designers have a major role to play in designing learning that is more personalised, situated and connected to smartphones as m-learning tools in secondary schools. The SAMR model includes four levels of technology integration and those are substitution, augmentation, modification, and redefinition. The model provides a framework to support educators and instructional designers in creating optimal learning experiences using mobile devices in education (Wahyuni, Mujiyanto & Fitriati, 2019; Romrell, Kidder & Wood, 2014). Learning activities that fall within the substitution and augmentation classifications are said to enhance learning, while learning activities that fall within the modification and redefinition classifications are said to transform learning (Puentedura, 2013).

Figure 4 represents the SAMR model which specifically plays a role in personilising learning using technologies. the SAMR model is one f the suitable models that could describe the adoption of mobile technologies use in secondary schools as m-learning tools because of its support to educators in creating personalised learning experiences.

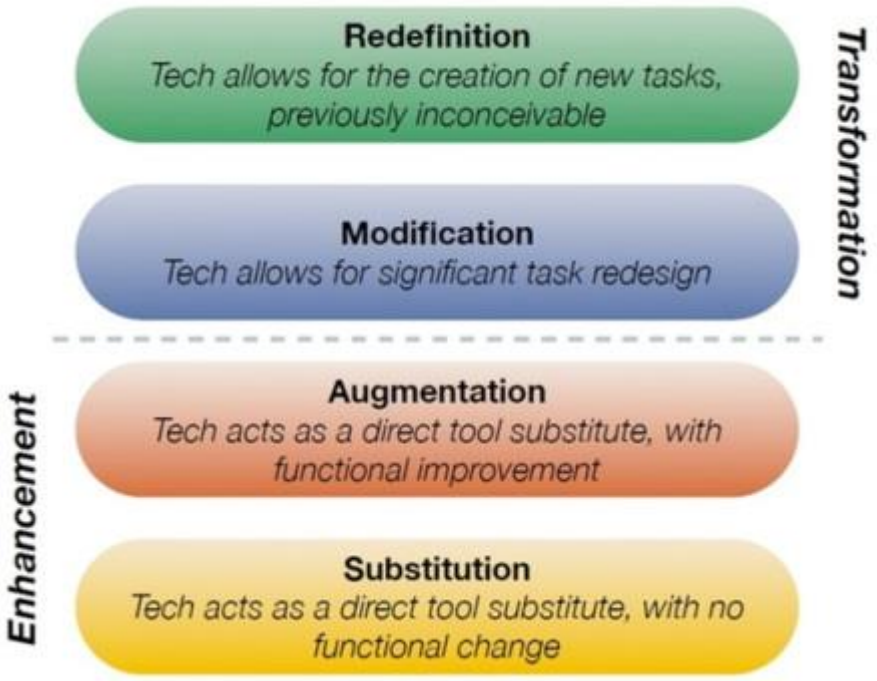


Figure 4. SAMR model to enhance technology education (Puentedura, 2014)

The SAMR model with its levels is recommended in evaluating mobile learning in education because of its levels which defines mobile technology integration in education. In the application of the SAMR model the four classifications are defined as follows:

The *substitution* refers to mobile technology integration to learning for the purpose of replacing the original method used before. Therefore, learning tasks falling under this classification can be done without using mobile technologies and learning can still take place (Wahyuni, Mujiyanto & Fitriati, 2019). For an example, the smartphone camera can be used to take notes rather than using an exercise book.

Augmentation classification refers to as an improvement where use of mobile technologies in learning tasks will improves levels of tools used for learning (Wahyuni, Mujiyanto & Fitriati, 2019). For an example, submitting a test through smartphone technology other than using the old ways of paper and pencil based assessments.

The *modification* classification level is based on the total transformation or redesigning of important learning tasks to common classroom tasks because of the use of mobile technology (Wahyuni, Mujiyanto, & Fitriati, 2019). The example, is situated learning, where student-centered learning is successfully accomplished using mobile technology as a supportive material.

The Redefinition classification levels is transformative, because it redefines the learning tasks where learners were not able to participate in, so the use of mobile technology use will assist the learners understanding the learning tasks so as to participate (Wahyuni, Mujiyanto, & Fitriati, 2019). An example, is designing an application on smartphones for English speaking learners to understand isiZulu language.

2.7.2.1 Connection between SAMR and m-learning definition.

Puentedura (2013) notes that learning activities that lie at the modification and redefinition levels of the SAMR framework can transform learning. It is at these higher levels of the SAMR framework that the full potential of learning via a mobile device is realised (Wahyuni, Mujiyanto, and Fitriati, 2019). The analysis reveals that every example at the re-definition level of the SAMR model was personalised, situated, and connected. If learning activities involving a mobile device are purposefully designed to be personalised, situated, and connected, the resulting m-learning activities have the potential to re-define and transform learning.

2.8 Summary

Considerable empirical evidence on literature was reviewed to shed some light on the path taken by this current research. The topics covered were aligned to the study objectives to be achieved. The researcher reviewed literature from books and journals articles to understand better the phenomenon of m-learning using the smartphones for secondary schools. The following chapter discusses the research methodologies employed in this study.

CHAPTER 3

RESEARCH METHODOLOGY, DATA COLLECTION AND TRIAGULATIONS

3.1 Introduction.

In the previous chapter the literature related to the use of smartphones as m-learning tools in educational institutions, particularly secondary schools were reviewed and discussed. The study focused on secondary schools SMT experiences, perceptions, willingness and readiness on the use of smartphones as m-learning tools. SMT has a role to play in the adoption of new of m-learning practice through the used smartphones as tools in the teaching and learning environment. This chapter discusses the research methodology which was used, which include: research methods, research paradigm, research design, population, sampling and sample sizes, data collection and data analysis.

3.2 Research Paradigm

Pragmatism paradigm was adopted for the study. Pragmatism fits into the current study because the study employed a mixed method approach where data collected and analysed was quantitative and qualitative in nature. Therefore, the researcher collected quantitative data from the respondents on the utilization of smartphones as m-learning tools in secondary schools and explain further the numerical data through qualitative data to deepen the understand of the study phenomenon. Kumar (2014) and Creswell (2014), state that the use of post positivism paradigm in a single study entails the collection of both qualitative and quantitative data. Therefore, for better understanding and explanation of the study phenomenon the researcher had to collect quantitative data from a large sample size and qualitative data for in-depth information on the phenomenon. Pragmatic researchers do not focus on the methods, but they emphasise the research problem and use all approaches available to understand the problem

(Creswell, 2014). The adopted paradigm seeks to sample participants quantitatively and qualitatively on a single study, so as to have a clear understanding of the subject matter.

The researcher observation is that most studies have been employing quantitative methods for educator's view and understanding of technology use in schools. This implies that there is less literature on the principals' deepened view and use of smartphones as m-learning tools in secondary schools while they are the custodians of change and technology promotion in improving teaching and learning. This current study employed a mixed method research design to view and understand SMT role and needs on smartphone use as m-learning tools in secondary schools. Providing an in-depth data that propagates how smartphones can be employed as tools of learning in secondary schools.

3.3 Research Design

The adoption of the pragmatism paradigm shed a light on the research design to be employed which was mixed methods research design. It's a process whereby quantitative and qualitative research methods are collected, analysed and interpreted in one research project (Creswell, 2014). Mixed methods research design enhances the quality of data collected and promotes triangulation (Cohen, Manion, and Morrison, 2011). Cohen, Manion, and Morrison (2011), asserts that mixed methods approach enables the researcher to develop analysis and build on the original data, and screen potential participants who might be approached for interviews. Therefore, qualitative data collected generated a detailed understanding and thick description of the phenomenon of smartphone use as a m-learning tool in selected secondary schools. The mixed method research design allowed the researcher to apply different forms of population sampling, different forms of data collection, and different forms of data analysis were employed in one single study (Creswell, 2014). Quantitative data was collected using questionnaires while qualitative data was collected using semi-structured interviews. Furthermore, probability sampling was used for the quantitative strand which represented

phase one of data collection and non-probability sampling for qualitative strand which represented phase two of data collection. Mostly in research, mixed methods are used to strengthen and enhance triangulation and validity of data (Creswell, 2014, Kumar, 2014; Cohen, Manion, & Morrison, 2011).

3.3.1 Description of the research design

The type of mixed methods approach used for this research study was the explanatory sequential mixed method approach. This approach appeals to two-phase project, firstly, the researcher collected quantitative data in the first phase, analysed the data, and then use the results to plan (or build on to) the second qualitative phase (Creswell, 2014). Therefore, the researcher collected quantitative data using a questionnaire in the first phase, analysed that data, then followed with semi-structured interviews for the collection of qualitative data. The current study falls in the explanatory sequential design because of its aim to explain and understand the perceptions of SMT members and educators on the use of smartphones as m-learning tools in secondary schools. The semi-structured interviews (qualitative) of principals who were identified on the quantitative phase were conducted to explain in-depth the SMT needs to support and enhance smartphones use as m-learning tools in secondary schools. Cohen, Manion, and Morrison (2011), assert that the over-all intent of this design is to have the qualitative data help explain in more details the initial quantitative results. The adoption of this approach in this study enabled triangulation and validation of the sets of data collected from both sets of participants and to answer research questions shown in chapter one.

3.4 Population

The targeted population of a study includes the entire population where every individual in the population has a chance to be drawn as a participant and used for generalisation (Cohen, Manion, and Morrison, 2011; Creswell, 2014 & Kumar, 2014). The targeted population for this study were SMT members and educators from secondary schools at King Cetshwayo District

which is one of the largest and with dispersed population districts in KZN. SMT members and educators are responsible for the improvements and developments of technology use for teaching and learning in schools. Additionally, the sample selected was from the rural and urban secondary schools in King Cetshwayo District, the district has both rural and urban secondary schools.

3.4.1 Quantitative study (Phase one)

Below is the discussion of the sample and sampling technique employed for the quantitative strand for this study**.** Since phase one of the study was quantitative in nature the researcher opted for the probability sampling method. The first phase sought to provide understanding of the respondents' use of the smartphones as m-learning tools in secondary schools. Probability sampling permits every single item in the universe to have an equal chance of presence in the sample (Etikan & Bulus, 2017). Probability sampling was useful because the researcher wanted to make generalisations seeking representativeness of a wider population (Cohen, Manion, & Morrison, 2011). One of the probability sampling technique used for the sample size of the quantitative phase of this study was referred to as cluster sampling.

The study employed cluster sampling technique to gather the required sample size from a very dispersed and large population. Onwuegbuzie and Collins (2007), describes cluster sampling technique as selecting intact groups representing clusters of individual rather than choosing individuals one at a time. In using cluster sampling technique, it is advisable to take several clusters and sample lightly from each cluster for biasness in the representation of a wider population (Onwuegbuzie & Collins 2007). Furthermore, in using cluster sampling the researcher had to randomly select a specific number of schools and got participants in those selected schools (Cohen, Manion, & Morrison, 2011). Once the clusters were selected, they were compiled into frames., various probabilistic researches and observations were performed on these frames and required conclusions were drawn (Sharma, 2017). Inside each cluster the

researcher used simple random technique to select two secondary schools per cluster so that each cluster could be represented equally thus avoiding biasness. Therefore, the sample size representing the population was predetermined in selected secondary schools which represented the population of SMT in each selected secondary schools. For the purpose for this study, the researcher divided King Cetshwayo District into five 5 (clusters). Table 1 represents the entire population of secondary schools in the King Cetshwayo disctrict where each cluster indicates the number of secondary schools represented in the cluster and where the sample size was drawn from.

Table 3: Representing the entire population and sample size

Clusters	**Total population (N) (number of secondary schools per cluster)**	**Sample size (n)**
Kwadlangezwa	8	2
Esikhaleni	13	2
Empangeni	6	2
Richards Bay	7	2
Eshowe	10	2

The figures of the number of schools per cluster were retrieved from the KCD office in Richards Bay. Each cluster was represented by two selected secondary schools, so as to gather adequate sample size, comprising of 10 schools, five (5) of which were selected from rural settings and the other five (5) from urban settings. Therefore, quantitative data was collected from 10 selected secondary schools who represented the sample size as follows:

- One (1) principal per secondary school which equals to ten (10) principals.
- Three (3) Head of Departments (HoDs) per school which equals to thirty (30) HoDs.

- Ten (10) educators per secondary school which equals to one hundred (100) educators.

Therefore, the sample size for quantitative phase was **140.**

3.4.1.1 Data collection for the quantitative phase

Quantitative research studies use different types of data collection instruments as tools of collecting data. In an explanatory sequential research design data collection proceeds into two distinct phases with rigorous quantitative sampling in the first phase and with purposive sampling in the second, qualitative phase (Creswell, 2014). This study opted for the use of questionnaires to collect quantitative data. Furthermore, data collection instruments such as questionnaires are adopted, sometimes modified and used by researchers to collect data. The researcher conducted a pilot study with one of the selected secondary schools from the Kwadlangezwa cluster. The reason for conducting the pilot study was to determine the extent to which the instrument used was reliable and credible. The questionnaire of this study was adopted and modified by the researcher to suit the objectives of the study stated in chapter one. The details of the modified and adopted questionnaire are as follows:

3.4.1.2 Instrumentation

Data for this study was collected through the use of self-administered questionnaires which were modified and adopted to suit the study objectives. It comprises of a series of questions in statements form in which respondents were expected to give their responses based on their experiences, perceptions and attitudes regarding smartphones use as m-learning tools in secondary schools. Questionnaires were self-administered by the researcher, respondents filled them in the presence of the researcher. Cohen, Manion, and Morrison (2011), aver that questionnaires are widely used and they are a useful instrument for collecting survey information, for providing structured often numerical data, and often being comparatively straightforward to analysis.

The designed and adopted questionnaires had five sections. The first section which is Section A, which had the biographical data of the respondents; for example, age, gender, position, job experience, smartphone ownership, mobile device used for education, online learning resources the respondent is aware of, then the location of the school.

Section B of the questionnaire asked about the roles of the DBE in promoting smartphone use as m-learning tools in secondary schools. This section used a 5 point Likert scale rating from "Strongly Agree" to "Strongly Disagree".

Section C, which is the third section of the questionnaire focused on the promotion of smartphones use in secondary schools by the respondents using a 5 point Likert scale rating from "Strongly Agree" to "Strongly Disagree" to determine the extent of their approval and disapproval of smartphone use in secondary schools.

Section D asked about the effects of using smartphones as m-learning tools by the respondents using a 3 point Likert scale of Yes (1), No (2) and Undecided (3).

Lastly section E focused on how respondents allow and motivate learners to utilise smartphones as m-learning tools in secondary schools using Yes (1) and No (2) options. The items of the questionnaires were designed in a manner that required respondents to be neutral in their responses. The total number of items in the questionnaire were 42, in Section A they were 8 items, Section B had 8 items, Section C had 7 items, Section D had 8 items, and Section E had 10 items, thus gives a total number of 42 items in the questionnaire.

3.4.1.3 Data collection procedure in the quantitative phase

Prior to the start of data collection, the researcher identified ten selected secondary schools at King Cetshwayo District to be part of the study. The targeted respondents were SMT members and educators i.e. the principals, Head of Departments (HoDs) and educators. Different guidelines were followed in collecting data through administering questionnaires.

3.4.1.4 Administration of questionnaire

The researcher visited two selected secondary schools per clusters identified above. The permission was obtained from the DBE KZN and secondary schools principals. When distributing questionnaires to SMT members and educators in schools, the school principal and the administrative staff in each selected secondary school assisted and supported the researcher with the list of the members. The researcher booked appointments with all the identified individuals and diarised visiting dates to each selected secondary school to self-administer questionnaires to SMT members and teachers per school. Before the completion of the questionnaires, the researcher had a 10 minutes' discussion with the respondents about the study and its purpose. Therefore, the researcher was able to administer 140 questionnaires in ten selected secondary schools at King Cetshwayo District for two weeks. In each of the 10 selected secondary schools 14 questionnaires were administered which equals to 140 questionnaires. The respondents were 1 principal, 3 HoDs and 10 educators from each selected secondary school at the King Cetshwayo District. Time spent in each selected secondary school was approximately three (3) hours to administer 140 questionnaires. There were 135 questionnaires (96%) completed and all of them used for the analysis of the quantitative data.

3.4.1.5 Quantitative data analysis

The descriptive research design employed for this study suggested that the quantitative and the qualitative data sources were analysed separately. Then quantitative results were then used to plan the qualitative follow-up. Kumar (2014), explains that quantitative data can be analysed using descriptive statistics which is one of the major functions of SPSS, while qualitative data can be analysed through the use of thematic analysis. For this study quantitative and qualitative data were differently analysed using different analytical systems.

In determining the statistical analysis of the study, SPSS 2018 version a computer software program designed specifically for social science research. The focus on using SPSS in the study

was on selecting the correct statistical test which was used to analyse the collected data. For the purpose of this research both descriptive and inferential statistics were used this is because descriptive statistics are used in research to describe and summarise data and inform what the data set look like. The statistics were converted and condensed into organised data, in both visual representation or picture, that was done for the data to be meaningful. The descriptive statistics in this study included frequency distributions with minimum and maximum value, mean percentages, and standard deviations.

3.4.2 Qualitative study: Phase two

Below is the discussion of the sample, sampling procedure, sampling technique, data collection tool and method employed for the qualitative strand for this study:

3.4.3 Sampling for the qualitative study

Since phase two of the study was qualitative in nature, the researcher opted for the non-probability sampling method to be employed in that phase. The second phase sought to provide in-depth information on the understanding of the participants' strategies and needs on the use of the smartphones as m-learning tools in secondary schools. The researcher targeted a particular group of principals from the quantitative sample size, which was initially sampled from the entire population, hence, non-probability sampling was used (Cohen, Manion, & Morrison, 2011). Furthermore, the non-probability sampling was employed by the researcher not to generalise the study findings beyond SMT in promoting and enhancing smartphones use as m-learning tools in secondary schools.

3.4.4 Sampling technique and sample size

The study employed purposive sampling technique to gather the required sample size to collect the data from. The sample size for the qualitative phase are a group of principals who were part of phase one sample which was quantitative in nature. The researcher purposefully selected ten

(10) principals from the selected secondary schools by virtue of their position as schools' leaders, to get an in depth view. Furthermore, the participants in the qualitative phase of the study share some characteristics as drivers of developments and new initiatives in schools. Purposive sampling is one of the non-probability sampling techniques, it is based on the judgement of the researcher as to who will provide the in-depth information to achieve the study objectives (Etikan & Bulus, 2017).

Table 4 represents the sample size of the qualitative data collected (phase two) of the study which only consisted of 10 principals from each selected secondary school at King Cestwayo District. Therefore, each of the the 5 clusters of the King Cestwayo District was represented by 2 principals which equals to 10 participants for interviews in the second phase. Additionally, the 10 principals for qualitative data collection were drawn from the same sample size of the quantitative data that was collected.

Table 4: Population and sample size for the qualitative phase

Clusters	**Total population (N) (number of secondary schools principals per cluster)**	**Sample size (n) Interviews**
Kwadlangezwa	8	2
Esikhaleni	13	2
Empangeni	6	2
Richards Bay	7	2
Eshowe	10	2

The qualitative phase of this study sample size was represented by the ten (10) principals from the selected secondary schools. However, only eight of them were available during the interviews.

3.4.5 Data collection for the qualitative phase

There are different methods of collecting data for a qualitative study. However, for this research interviews were adopted as collection instruments to collect data from the participants who were hand-picked from the sample from which the quantitative data was collected.

3.4.6 Interviews

The researcher opted for the use of semi-structured interviews to collect data for the qualitative phase of the study. The semi-structured interviews were conducted to get an in-depth information on how secondary schools SMT members can adopt smartphone use for m-learning tools. Coughlan (2009), purports that semi-structured interviews offer a more flexible approach to interviewees and the interviewer. The study required flexibility so as to understand how SMT members can influence, support, and enhance m-learning in secondary schools using smartphones. The main aim was to get the understanding of the needs required by the SMT members to support and promote smartphones use as m-learning tools. Most of the questions on the interview schedule were open-ended questions. Eight interviews were conducted instead of ten interviews reason being the other two principals were not available during their time slot scheduled for interviews. Therefore, the researcher ended up conducting eight interviews.

3.4.7 Data collection procedure in the qualitative phase

The researcher can follow different collection data procedures for the qualitative study. However, for this study, qualitative phase was done through semi-structured interviews with ten (10) principals from the selected secondary schools at King Cetshwayo District.

Interview schedule guide

The interview schedule guide was designed with key questions, which were grouped thematically for referencing and prompts which required responses from the interviewees. These themes were created to be used spontaneously rather than referring to the schedule now

and again. The researcher experienced some difficulties in getting the other two respondents for interviewing, as a result, eight respondents were interviewed instead of ten. Therefore, eight interviews we conducted and time allocated for each interview was 20 to 30 minutes. However, for three out of the eight respondents their interviews lasted for 45 minutes. The researcher observed that the three interviews took more time because the respondents showed more interest and provided more depth on the questions asked. During the interviews the recorder was used to record the responses which were later transcribed and organised into themes.

3.4.8 Qualitative data analysis

Thematic coding was used to manually analyse qualitative data collected from the respondents who were principals from the selected secondary schools. The researcher employed the services of a transcriber who transcribed the responses of the respondents, then responses were coded into four different themes based on the questions that were asked during the interview. The researcher used two instruments to collect data and answer all research question stated in the first chapter of this study. The reason for using two instruments was to ensure triangulation of the research findings. Triangulation is explained as the use of multiple methods mainly qualitative and quantitative methods in studying the same phenomenon for the purpose of increasing study credibility (Hussein, 2009). Therefore, for the current study research the use of the two methods which is quantitative and qualitative (which is triangulation) assisted the researcher to increasing the credibility of the study and brought more explanations and understanding to the phenomenon studied by this research.

3.5 Validity and reliability of the survey instruments

It is worth noting that mixed method approaches are driven by pragmatism that yields real answers to real questions, that is useful in the real world, and that increases validity and reliability of the instrument (Cohen, Manion, and Morrison, 2011). Hence, this research study employed a pragmatic paradigm to underpin it, in an endeavour to collect and analyse real data

which brought clarity to the phenomenon under study. The pilot study was conducted of the in one of the selected secondary schools at KwaDlangezwa cluster. The pilot significantly strengthened the reliability of the instrument used to collect data. The used of a mixed method explanatory sequential design validated the instruments used to collect data.

Survey instrument validity

In defining validity accurateness of the findings must describe the phenomenon being researched, therefore Cohen, Manion, and Morrison (2011), defined validity as the "true value, applicability, consistency, neutrality, dependability, and/or credibility of interpretations and conclusions within the underlying setting or group". The preparation of the questionnaire and the interview schedule guide were designed and submitted for examination to the experts in both the quantitative and qualitative fields and also to the supervisor to ascertain its construct and content validity. Ani (2014), observes that the examination of research instruments by experts or professional's in the field of the research conducted is important and validate social sciences research. This implies that validity assists researchers to draw a very sound conclusion from their analysed data. In this study the comments which were made by the experts in the field and the supervisor regarding the interview schedule guide were taken into considerations before the final draft was prepared and used. Furthermore, the construction of the interview schedule guide was informed by the analysis of quantitative data which assisted the researcher to design the questions which were used during the collection of qualitative data. Validity was ensured through using appropriate instruments; questionnaires for quantitative phase and semi-structured interviews for the qualitative phase. Additionally, validity in the current research study was ensured when the scores of the quantitative instrument related to the scores of the qualitative instrument. Furthermore, to safe guard validity the researcher ensured that the follow up qualitative sample was from the subset of respondents who completed the quantitative instrument. However, because of the unequal samples of the two phase of data

collected the term legitimation was employed to further validate data in a mixed method approach. Cohen, Manion, and Morrison (2011), state that legitimation indicates that trustworthiness of both the quantitative and qualitative data and their interpretations.

Survey instrument reliability

Cohen, Manion, and Morrison (2011), state that reliability "measures the consistency over time and over similar sample the quantitative instrument for a piece of research would yield similar data from similar respondents over time". One of the measures of ensuring reliability in this study, was to conduct a pilot study which was essential in testing, verifying and refining the research instrument and to identify problems that could be encountered by the respondents. The respondents in one of the selected secondary school in the KwaDlangezwa cluster were asked to fill the questionnaire, and comment where items in the instrument were not clear. Therefore, after the pilot study the researcher made improvements on the questionnaire which were indicated by the respondents. For the qualitative phase the pilot was done with one principal from the selected secondary schools to test the instrument. The errors such as unclear sentences, statements, and spelling were corrected. So the interview question guide was improved and used for the main study. Therefore, reliability assumes that if were we to administer a questionnaire concurrently to two groups of educators who are very closely matched on significantly characteristics, then similar results or responses would be obtained (Cohen, Manion, & Morrison (2011).

3.6 Ethical considerations

This research study was conducted based on various ethical considerations which were provided by the researcher's institution, where the researcher was registered. Firstly, the ethical clearance was received from the research office at the University of Zululand. Secondly the researcher obtained permission from of DoE KZN to use selected secondary schools SMT

members and teachers as respondents and participants in the study. Thereafter another permission was received from the selected secondary schools' principals to collect data from the selected staff members. Therefore, the data collected for this study was conducted in line with the data collection procedures of conducting research.

Participation in this research study was voluntary and participants were informed that they could decide not to participate at any given time when they felt uncomfortable during the data collection time. Hence, it was important for the researcher to inform the participants about the purpose and the nature of the research conducted. The researcher informed all SMT members and educators in selected secondary schools about the nature and the purpose of this research study. Furthermore, respondents' /participants confidentiality was ensured and they were not required to provide their names on the questionnaire or during the interview. The consent form was also used which had all the information needed by the participants/respondents. The form was read and signed by the participants/ respondents before the completion of the questionnaire and the start of the interview.

3.7 Limitations of the study

Various constraints were experience during the data collection process. Firstly, the study was limited to ten (10) selected secondary schools which represented a very wider and disperse population of secondary schools in the King Cetshwayo District. Secondly, instead of getting 140 questionnaires only 135 were completed and returned for quantitative data. The other missing 5 questionnaires we not returned by the respondents to make it 140 questionnaires administered and received. For qualitative data instead of conducting 10 face-to-face interviews only eight were conducted and the two were not available during the time of the interviews. The findings cannot be generalised to all secondary schools at KCD, however they are a true reflection of some secondary schools across the globe.

3.8 Summary

This chapter presented the research methodology of this study, where the approaches, methods, sampling techniques used to conduct the study were discussed. The study research design allowed the researcher to use both quantitative and qualitative approaches to collect data. Therefore, questionnaires were used to collect quantitative data while semi-structured interviews were used to collect qualitative data. The sample size for the quantitative phase was one hundred and forty (140) SMT members and educators from the selected secondary schools, while for qualitative phase ten (10) principals from the selected secondary schools were interviewed. The validity and reliability of the two instruments used in this study was discussed. Quantitative data was coded and entered in the Microsoft Excel package before SPSS 20.0 software was used to analyse the results. Furthermore, qualitative data was transcribed, coded and analysed thematically.

Analyse and presentation of all data retrieved from the two phases of the study through questionnaires and semi-structured interviews are presented in the following chapter.

CHAPTER 4

PRESENTATION OF QUANTITATIVE RESULTS

4.1 Introduction

In the previous chapter, the methodology adopted for data collection and analysis was presented. This chapter entails, presentation of quantitative results collected by means of a questionnaire. Sequel to the adoption of explanatory sequential design as identified and explained in the previous chapter, the designed questionnaire was used to proffer answers to the research questions guiding this study. For the purpose of clarification with regards to the collected quantitative data, semi-structured interviews were used to probe further. Thus, this chapter presents the results of data collected using the questionnaires for the purpose of quantitative data collection, therefore, those results are presented in tables, figures, and graphs.

The phase one of data collection process which is the questionnaire consist of five sections: see below:

Section A presents the biographical information which includes: gender, age, position, job experience, smartphone ownership, mobile device used for education, online resources for secondary schools, and the location of the school.

Section B provides the information in relation to policies, infrastructure, strategies, resources, and training required by the SMT to promote smartphones use as m-learning in secondary schools.

Section C presents the information in relation to internet access, usefulness and effectiveness of the smartphone tool for m-learning in secondary schools.

Section D provides the information in relation to m-learning, online learning resources, mobility of learning, smartphone technology, and m-learning. This information is taken as the essence of using the smartphone as a tool for m -learning in secondary schools.

Section E provides information regarding the interventions to promote smartphones use as m-learning tools and how the SMT allows learners to use smartphones in secondary schools as m-learning tools.

4.2 Phase one: Quantitative data collection and analysis

All of the study questionnaire responses were analysed using SPSS and validity and reliability test was also conducted. Section B and C items were responded on to a Likert scale constructed consisting of 'strongly agree' 'agree' 'unsure' 'disagree' and 'strongly disagree' categories of responses (1 = Strongly Agree to 5 = Strongly Disagree). Section D was responded on to a Nominal scale of Yes = 1, No = 2 and Undecided = 3. While section E was responded on a Nominal scale of Yes = 1 and No = 2.

The quantitative results were further analysed using the chi-square test for cross tabulations and significant associations between the variables in the questionnaire. The use of descriptive statistics assisted the study with respective statistical results to inform the qualitative side.

4.2.1 Data Screening

In conducting multivariate regression analysis data collected must be clean and screened for accuracy, usability and consistency. Data screening for this research was done to ensure that there is reliability and validity in the instrument used to collect data. Data entry in Microsoft Excel simplified the researcher's work in visual checking data consistency and missing data. There after data was exported to IBM SPSS Statistics 25 for descriptive data analysis and techniques for data handling and backup.

4.2.2 Missing data

The study respondents were randomly sampled in both urban and rural areas of the King Cetshwayo District. Approximately 20 secondary schools are located in the King Cetshwayo District. However, for the purpose of the study eight (8) secondary schools were sampled. Therefore, the researcher randomly selected four (4) urban and four (rural) secondary schools to conduct research on the views and experiences of the SMT in using smartphones as m-learning tools in secondary schools. The main aim of the research was to develop SMT intervention programme aimed at promoting and enhancing smartphones use in secondary schools as m-learning tools.

Therefore, the researcher administered questionnaires to 40 SMT members from the eight secondary for a period of two weeks. Only 135 questionnaires were received, so there were 5 missing questionnaires from the sample size. Missing data or responses are valued in research because they may affect the results of the research if not handled properly using different techniques to manage missing data. However, there were no neglected responses in all returned questionnaires and the missing questionnaires did not affect the analysis of data.

4.2.3 Reliability test

Table 5

Table 5 represents the reliability test which measures the questionnaire reliability and its internal concinstency.

Reliability Test

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.812	.781	33

The reliability analysis was carried out for the entire study, the questionnaire which had 41 items was used (across all sections of the instrument). The Cronbach's Alpha indicated the questionnaire to have reached the accepted reliability of 0.812 which indicates that the instrument is reliable and has high internal consistency.

4.2.4 Validity test

Table 6

Table 6 represents the validity test in measuring the internal consintency on the sample size.

Validity test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.706
Bartlett's Test of Sphericity	Approx. Chi-Square	1581.495
	Df	528
	Sig.	.000

The current research used Kaiser-Meyer-Olkin (Kaiser, 1970) to measure internal consistency on the sample size and for assessing adequacy of the correlation matrix for factor analysis. The SPSS Statistics 25 software indicates that KMO values near 1.0 supports factor analysis and that anything less than 0.5 is not amenable to useful factor analysis. For the present study the KMO is 0,706 indicating the appropriateness and validity of the study to use factor analysis. The study results show a Bartlett's test value of 0.000 which is a small value indicating the significance of relationship of the variables and useful for factor analysis.

It is important to establish the initial reliability of each measure (Im et al., 2011). As a form of reliability for direct measures, the index of internal consistency may be used. Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. All value-indicators mentioned in table 2 were well above the prescribed 0.7 excellent.

According to Henseler, Ringle, and Sinkovics, (2009) Cronbach's alpha should have values higher than 0.7 to be deemed reliable.

4.3 Questionnaire: Section A: Biographical data

4.3.1 Descriptive Statistics

The data of the study was collected over a period of two weeks from both urban and rural SMT members of secondary schools in the King Cetshwayo District. The reliability, validity, and nominal tests were done to the questionnaire before being administered to the study sample. The study employed mixed methods research design, therefore, the results of the quantitative part were used to develop the qualitative items used in the semi-structured interviews.

Table 7

Table 7 represents the Age groups participated in the current research study.

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 29	25	18.5	18.5	18.5
	30-39	42	31.1	31.1	49.6
	40-49	40	29.6	29.6	79.3
	Over 50	28	20.7	20.7	100.0
	Total	135	100.0	100.0	

The first question was designed to obtain the number of age groups who participated in the current research. The respondents were divided into four age groups; below 29, 30-39, 40-49, and those over 50. From these age groups the majority of respondents were 31.1% and it was a group between 30 to 39, 29.6% of the respondents were 40 to 49 years, 20.7% were above 50, and 18.5% were below the age of 29. In total 135 respondents responded to this question.

Table 8

Table 8 represents the gender of the current research respondents.

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	54	40.0	40.0	40.0
	Female	81	60.0	60.0	100.0
	Total	135	100.0	100.0	

The second question was asked to obtain gender difference from the respondents. There were 135 respondents to this question and 60 % of the respondents were females and 40 % were male respondents.

Table 9

Table 9 represents the positions of the respondes in secondary schools.

Position					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Principal	19	14.1	14.1	14.1
	Head of Department	38	28.1	28.1	42.2
	Educator	78	57.8	57.8	100.0
	Total	135	100.0	100.0	

This question sought to determine the positions of the respondents those who are SMT members and educators. There were 135 respondents who responded to this question. Principals comprised 14.1% of the total respondents, while HoDs made up 28.1% of the total respondents, and the educators were in majority with 57.8% of the total number of respondents.

Table 10

Table 10 represents the job experiences of the current research respondents.

Job experience					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 5 years	46	34.1	34.1	34.1
	6-10 years	17	12.6	12.6	46.7
	11-15 years	17	12.6	12.6	59.3
	16-20 years	24	17.8	17.8	77.0
	Over 20 years	31	23.0	23.0	100.0
	Total	135	100.0	100.0	

The question on job experience sought to get the years of teaching experience the respondents had teaching in secondary schools. There were 135 respondents who responded to this question. has the highest number of teaching experience were those who had under 5 years' experiences who made up 34.1%, followed by those who have taught for 20 years and above with 23%, and those who have taught for16 to 20 years made 17.8%. Those who had taught for 6 to 10 and 11 to 15 years of experience shared 12.6% respectively.

Table 11

Table 11 represents the ownership of a smartphone or tablet.

I own a Smartphone/Tablet					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Smartphone	95	70.4	70.4	70.4
	Tablet	2	1.5	1.5	71.9
	Both	36	26.7	26.7	98.5
	None	2	1.5	1.5	100.0
	Total	135	100.0	100.0	

The aim of this question was to find out whether the SMT members and educators own a smartphone. The ownership of the smartphone easily determines educators' willingness and readiness to use smartphones as m-learning tools in secondary schools. The results indicated

that 70.4% of them own a smartphone, and 26.7% own both a smartphone and a tablet. While only 1.5% of them indicated that they do not own any mobile device and the other 2% indicated that they only own a tablet.

Table 12

Table 12 represents the type of the mobile device the respondents uses for education purposes.

My mobile device I use for education in secondary schools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Smartphone	86	63.7	63.7	63.7
	Tablet	5	3.7	3.7	67.4
	Both	26	19.3	19.3	86.7
	None	18	13.3	13.3	100.0
	Total	135	100.0	100.0	

The aim of this question was to indicate the willingness and readiness of the SMT members and educators to support the use of smartphones as m-learning tools. The results revealed that 63.7% of the SMT members and educators use the smartphone for educational purposes, while 19.3% of them indicated that they use both smartphones and tablets. Only 3.7% of the respondents indicated that they use only a tablet for educational purposes and 13.3% said they use neither a smartphone nor a tablet for educational purposes.

Table 13

Table 13 represents online learning resources the respondents are aware of.

I am aware of the following secondary education online learning resources for learners/Educators					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	FUNducation	2	1.5	1.5	1.5
	SABC Education	77	57.0	57.0	58.5
	Thutong National Education Portal	5	3.7	3.7	62.2
	Teacherpedia	37	27.4	27.4	89.6

	Maths Excellence	4	3.0	3.0	92.6
	Maths Online	10	7.4	7.4	100.0
	Total	135	100.0	100.0	

In this question, the respondents were asked to indicate online learning resources they are aware of. The majority of the respondents who comprised 57% revealed that SABC Education is the most online learning resource they are aware of. SABC Education is an initiative by DBE in promoting online learning. The Teacherpedia online learning resource was indicated by 27.4% of the respondents as the online resource they are aware of. Math online, was known by 7 4% of the respondents, while 3.7% of the respondents were aware of the Thutong National Education Portal. On the other hand, 3% of respondents were aware of Maths Excellence, and 1.5% were aware of FUNducation.

Table 14

Table 14 represents the location of the secondary schools of the respondents.

School location					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Urban	63	46.7	46.7	46.7
	Rural	72	53.3	53.3	100.0
	Total	135	100.0	100.0	

This question was meant for the respondents to indicate the location of their secondary schools, whether they are urban or rural areas of the King Cetshwayo District. The rural secondary schools' respondents dominated the sample with 53.3%, while urban secondary schools counted for 46.7%.

Questionnaire: Section B

Section B of the questionnaire aimed at assessing the respondents in determining their needs such as training and policy design, so as to enhance the use of smartphones as m-learning tools

in schools. The DBE provides assistance in promoting smartphones use as m-learning tools in secondary schools. The SMT members and educators were seen as agencies of change and management in schools, therefore, their opinions could assist in how the DBE support and enhance smartphones use as m-learning tools in schools.

Section B of the questionnaire has 8 questions designed in a 5 point Likert scale all from Strongly Agree to Strongly Disagree (see Appendix B for precise details of the instrument). The questions were designed to deal with the SMT members and educators' ideas, opinions, and perceptions of whether there is a role that can be played by the DBE to promote and enhance smartphones use in secondary schools as m-learning tools

The questions in section B were based on the literature reviewed on the policies and structures that the DBE has in place to promote technology use in schools. Moreover, from the literature, it is indicated that DBE has an influential role in promoting and enhancing smartphone technology use in schools through policies and initiatives that support m-learning in secondary schools. Responses that indicated strongly agree and agree were grouped as agreeing with the statement. Most respondents strongly agreed and agreed that the DBE should provide SMT members and educators with policies, initiatives, strategies, and training to promote and enhance smartphones use as m-learning tools in secondary schools. Their agreeing with the questions indicates that there is a role to be played by the DBE in promoting smartphones use in secondary schools. In all the 8 questions that needed to be answered, most of the scores were on high frequencies and percentages when it comes to agree and strongly agree. This indicates that there is a need of using smartphones in secondary schools as m-learning tools. However, secondary schools require more support and training from the DBE to use these devices as m-learning tools.

Table 15 indicates supporting infrastructures required to implement the utilization of smartphones as m-learning tools in secondary schools: infrastructures such as WiFi, technological resources and other requirements for m-lerning in secondary schools.

Table 15

Supporting infrastructures such as WIFI spots in secondary schools enhances smartphone use as a m-learning tool					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	68	50.4	50.4	50.4
	Agree	56	41.5	41.5	91.9
	Uncertain	6	4.4	4.4	96.3
	Disagree	1	.7	.7	97.0
	Strongly disagree	4	3.0	3.0	100.0
	Total	135	100.0	100.0	

This question was designed to determine which infrastructure may assist and promote the use of smartphones as m-learning tools in secondary schools. Most respondents 50.4% of them strongly greed and 41.5% of them agree that secondary schools need infrastructures such as Wi-Fi to promote and enhance smartphone use in schools as m-leaning tools.

Table 16

Table 16 represents the information on whether they should be DBE policies in place for smartphones use in secondary schools for teaching and learning.

There should be DBE policies in place for use of smartphones for teaching and learning in secondary schools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	73	54.1	54.1	54.1
	Agree	58	43.0	43.0	97.0
	Uncertain	3	2.2	2.2	99.3
	Strongly disagree	1	.7	.7	100.0
	Total	135	100.0	100.0	

The main aim of this question was to determine whether secondary schools have policies that support and promote smartphones use as m-learning tools. The responses revealed that 54.1 % of the respondents strongly agreed and 43% of them agreed, that they need policies in place to support and promote smartphones use in secondary schools as m-learning tools. This indicates that the DBE has a role to play in clarifying the use of smartphones as m-learning tools in secondary schools.

Table 17

Tables 17 represents the promotion of smartphones use as m-leaning tools in secondary schools.

DBE can support long life learning by promoting smartphone use as mobile learning tools in secondary schools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	64	47.4	47.4	47.4
	Agree	65	48.1	48.1	95.6
	Uncertain	6	4.4	4.4	100.0
	Total	135	100.0	100.0	

This question was designed to indicate that one of the main aims of the DBE is to promote the culture of long-life learning using smartphone technology among educators and learners in secondary schools. The literature indicates that using smartphones for learning helps as learning can take place anytime and anywhere. The nature of the device is that it can easily promote and enhance the culture of life-long learning promoted by DBE. The responses revealed that 47.4% of the respondents strongly agreed and 48.1% agreed that smartphone use in secondary schools can promote and enhance life-long learning.

Table 18

Table 18 represents the statement on whether DBE should allow and support strategies for each secondary school on the use sf smartphones as mobile learning tools outside classroom.

DBE should allow and support strategies for each secondary school on the use of smartphones as mobile learning tools outside classroom environments in secondary schools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	54	40.0	40.0	40.0
	Agree	62	45.9	45.9	85.9
	Uncertain	12	8.9	8.9	94.8
	Disagree	3	2.2	2.2	97.0
	Strongly disagree	4	3.0	3.0	100.0
	Total	135	100.0	100.0	

In asking whether there should be strategies designed by secondary schools on the use of smartphones as m-learning tools, the responses indicated that indeed it is the role of the schools to design those strategies and put them in place to support m-learning in schools. 40% of the respondents strongly agreed and 45.9% agreed that strategies must be designed by schools and supported by the DBE.

Table 19

Table 19 represents the statement on whether should the DBE provides more mobile devices like smartphones to promote m-learning in secondary schools.

The DBE should provide more mobile devices like the smartphone to promote mobile learning in secondary schools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	62	45.9	45.9	45.9
	Agree	63	46.7	46.7	92.6
	Uncertain	7	5.2	5.2	97.8
	Disagree	2	1.5	1.5	99.3
	Strongly disagree	1	.7	.7	100.0
	Total	135	100.0	100.0	

In determining the availability of smartphones in secondary schools for their use as m-learning tools, the responses indicated that the DBE should provide devices such as smartphone to secondary schools to support and promote m-learning. Responses revealed that 45.9%of the respondents strongly agreed and 46.7% of them agreed to the provision of smartphones by the DBE in secondary schools to promote their use as m-learning tools.

Table 20

Table 20 represents the statement on whether should we have initiatives form DBE that enables smooth integration of m-learning in secondary schools.

There should be initiatives from the DBE to enable the smooth integration of mobile learning in secondary schools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	59	43.7	43.7	43.7
	Agree	68	50.4	50.4	94.1
	Uncertain	7	5.2	5.2	99.3
	Strongly disagree	1	.7	.7	100.0
	Total	135	100.0	100.0	

In determining whether more initiatives are required to support the smooth integration of smartphones as m-learning tools in secondary schools, this question was designed. Initiatives such as online learning resources for educators and learners are accessible via the use of smartphone technology such as SABC Education. Responses indicated that 43.7% strongly agreed and 50.4% agreed that more initiatives are required from the DBE that enables smooth integration of m-learning in secondary schools.

Table 21

It is the role of the DBE to motivate, enhance and promote teachers and learners to use mobile technologies such as smartphones in secondary schools as learning aids					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	62	45.9	45.9	45.9
	Agree	63	46.7	46.7	92.6
	Uncertain	8	5.9	5.9	98.5
	Disagree	2	1.5	1.5	100.0
	Total	135	100.0	100.0	

This question was asked to determine the views and ideas of the respondents on whose responsibility is it to motivate, enhance, and promote mobile technologies use in secondary schools. Responses indicated that it is the role of the DBE to motivate, enhance and promote the use of mobile technologies in secondary schools. The findings revealed that 45.9% of the respondents strongly agreed and 46.7% agreed that, indeed DBE should motivate, enhance and promote mobile technologies use in secondary schools.

Table 21

Table 21 represents the statement on whether should the DBE train teachers on the use of smartphones as learning tools in secondary schools to promote m-learning.

The DBE should train teachers on the use of smartphones as learning tools in secondary schools to promote mobile learning					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	84	62.2	62.2	62.2
	Agree	45	33.3	33.3	95.6
	Uncertain	4	3.0	3.0	98.5
	Strongly disagree	2	1.5	1.5	100.0
	Total	135	100.0	100.0	

This question was asked to determine whether there is training required by educators to be provided by the DBE in promoting and supporting the use of smartphones as m-learning tools in secondary schools. Responses indicated that there is indeed training that is required by educators to enable smartphone use in secondary schools as m-learning tools. 62.2% of the respondents strongly agreed and 33.3% agreed that training from the DBE is needed in secondary schools so as to promote the use of smartphones as m-learning tools.

Questionnaire: Section C

Section C of the questionnaire aimed at assessing the respondents in determining the effectiveness of smartphone usage as an m-learning tool in secondary schools. The respondents' views, experiences and perceptions were used to investigate the effects of smartphone use as an m-learning tool in secondary schools. Moreover, the respondents were asked to determine whether it is the right tool for use in secondary schools. Section C of the questionnaire had 7 questions designed in a 5 point Likert scale format, all from Strongly Agree to Strongly Disagree (see Appendix B for precise details of the survey). The questions were designed to get SMT members' and teachers' ideas, opinions, and perceptions of whether smartphones are effective tools to be used for m-learning in secondary schools. For example, there are many mobile technologies that could have been chosen, however, this research project focuses on smartphones.

The 7 questions in Section C were designed based on the reviewed literature on how effective the smartphone is when used as an m-learning tool in the learning context. However, most of the literature reviewed is based on HE context on the smartphone use as an effective tool for m-learning which assisted the researcher in designing these questions. Most responses from all 7 questions have high percentages in the strongly agree and agree category in Section C, revealing that the smartphone is the best effective m-learning tool that can be used by secondary

schools. However, in question 5 the responses also agreed that smartphones can be destructive and ineffective during teaching and learning if not used properly.

Objective 1 was to determine the effects of using smartphones as a m-learning tools in secondary schools in KCD.

Table 22

Table 22 represents the statement on whether a smartphones are useful tools for m-learning in secondary schools.

Smartphones are useful tools for m-learning in secondary schools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	64	47.4	47.4	47.4
	Agree	63	46.7	46.7	94.1
	Uncertain	5	3.7	3.7	97.8
	Disagree	2	1.5	1.5	99.3
	Strongly disagree	1	.7	.7	100.0
	Total	135	100.0	100.0	

This question was designed to determine the usefulness of smartphones as an m-learning tool in secondary schools. The literature revealed that HE institutions benefit from allowing students to use smartphones as m-learning tools. As it is the most dominating mobile technology device users find it more useful than any other mobile device. Responses indicated that 47.4% of respondents strongly agreed and 46.7% agreed that a smartphone is a useful tool for m-learning in secondary schools.

Table 23

Table 23 represents statement on whether snartphones access and use should be promoted in secondary schools to enhance m-learning.

Smartphone access and use should be promoted in secondary schools to enhance mobile learning					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	57	42.2	42.2	42.2
	Agree	71	52.6	52.6	94.8
	Uncertain	5	3.7	3.7	98.5
	Disagree	1	.7	.7	99.3
	Strongly disagree	1	.7	.7	100.0
	Total	135	100.0	100.0	

This question was asked to determine respondents' perceptions and experiences on smartphone use and access to promote m-learning in secondary schools. The responses revealed that 42.2% strongly agreed and 52.6% agreed that smartphones use and access to secondary schools should be promoted so as to support m-learning in secondary schools. Most of learning institutions that promote and support smartphone use, easily enhance m-learning in their learning context.

Table 24

Table 24 represents the statement on whether smartphones use as m-learning tools culd generate more knowledge and content in secondary schools.

More knowledge and content should be generated if smartphones are used as mobile learning tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	60	44.4	44.4	44.4
	Agree	63	46.7	46.7	91.1
	Uncertain	9	6.7	6.7	97.8
	Disagree	3	2.2	2.2	100.0
	Total	135	100.0	100.0	

This question was asked to determine if there is a need for secondary schools to generate more content and knowledge so as to use smartphones as m-learning tools. The responses displayed that 44.4% of the respondents strongly agreed and 46.7% agreed on a need to generate more content and knowledge on the smartphones use as m-learning tools in secondary schools.

Table 25

Thable 25 represents the statement on whether smartphone use enhances teaching and learning in secondary schools.

Smartphone use enhances teaching and learning in secondary schools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	59	43.7	43.7	43.7
	Agree	68	50.4	50.4	94.1
	Uncertain	6	4.4	4.4	98.5
	Disagree	2	1.5	1.5	100.0
	Total	135	100.0	100.0	

The above question was designed to determine whether respondents view smartphone use as a tool that can enhance teaching and learning in secondary schools. Responses indicated that 43.7% strongly agreed and 50.4% agreed that smartphones can enhance teaching and learning in secondary schools.

Table 26

Table 26 represents the statement on whether smartphones use destructs teaching and learning if nt used appropriately as m-learning tools.

Smartphone destructs teaching and learning if not used appropriately as mobile learning tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	62	45.9	45.9	45.9
	Agree	51	37.8	37.8	83.7
	Uncertain	6	4.4	4.4	88.1
	Disagree	7	5.2	5.2	93.3
	Strongly disagree	9	6.7	6.7	100.0
	Total	135	100.0	100.0	

Question 5 in section C was asked in order to determine if smartphone use, destruct teaching and learning in secondary schools if not used appropriately. Responses displayed that 45.9% strongly agreed and 37.8% agreed that if smartphones are not used properly in teaching and learning they can destruct the process of teaching and learning. Therefore, appropriate strategies and ways are required for the use of smartphones as m-learning tools in secondary schools.

Table 27

Table 27 represents the statement on whether each secondary school requires school policy according to the context of school to promote smartphones as m-learning tools.

Each secondary school requires a school policy according to the school context to promote smartphones as mobile learning tools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	69	51.1	51.1	51.1
	Agree	54	40.0	40.0	91.1
	Uncertain	9	6.7	6.7	97.8
	Disagree	3	2.2	2.2	100.0
	Total	135	100.0	100.0	

Question 6 meant to determine if secondary schools requires a policy to guide and promote smartphones use as m-learning tools. Responses displayed that 51.1% strongly agree and 40% agreed that for secondary schools to promote smartphones use as m-learning they need to have in house policy that promote and support smartphones use as m-learning tools.

Table 28

Table 28 represents the statement on whether the smartphone is an effective tool for using learning resources from the internet.

Smartphone is an effective tool for using learning resources from the internet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	70	51.9	51.9	51.9
	Agree	57	42.2	42.2	94.1
	Uncertain	6	4.4	4.4	98.5
	Disagree	2	1.5	1.5	100.0
	Total	135	100.0	100.0	

Question 7 was designed to determine the effectiveness of the smartphone use in accessing learning resources through the internet in secondary schools. Responses displayed that 51.9% strongly agreed and 42.2% agreed that smartphone use as an effective tool to access learning resource through the internet can benefit the learning process in secondary schools.

Questionnaire: Section D

Section D of the questionnaire focused on determining the respondents' understanding of the essence of m-learning using the smartphone as a tool in secondary schools. Section D had 8 question structured in a "Yes", "No" and "undecided" scale (see appendix B for precise details of the questionnaire). Most responses from the 8 questions fell in the "Yes" category displaying respondents understanding the importance of smartphone as m-learning tool in secondary

schools. The questions were designed based on the literature reviewed which provided the researcher with insight on understanding the effects of smartphone technology use as an m-learning tool in secondary schools. Moreover, the responses shed some light on the respondents' willingness to support and promote smartphones use as m-learning tools in secondary schools. For example, as the respondents are agencies of change in schools, responses indicated that they understand how smartphone technology use as an m-learning tool can benefit secondary schools to become learning and information sharing centres.

The aim of objective 2 was to identify ways by which the SMT members and teachers can motivate learners in secondary schools to effectively use smartphones as m-learning tools.

Table 29

Table 29 represents the statement on whether the smartphone technology has brought about advancement in teaching and learning settings.

Smartphone technology has brought about advancement in teaching and learning settings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	125	92.6	92.6	92.6
	No	3	2.2	2.2	94.8
	Undecided	7	5.2	5.2	100.0
	Total	135	100.0	100.0	

The question was asked to the respondents to indicate whether the respondents understands the advantages the smartphone has brought in the teaching and learning space in secondary schools. In question 7 respondents were required to indicate online resources that could be accessed via the smartphone and also if they are aware of those resources. Most respondents indicated that they were aware of the online resources such as SABC Education. There were 92.6% yes responses on how smartphone use has brought advantages in the teaching and learning process in secondary schools.

Table 30

Table 30 represents the statement on whether smartphone technology use allows learners and educators to stay connected with each other to share learning resources.

Smartphone technology use allows learners and educators to stay connected with each other to share learning resources					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	128	94.8	94.8	94.8
	No	3	2.2	2.2	97.0
	Undecided	4	3.0	3.0	100.0
	Total	135	100.0	100.0	

The question was designed to determine how the smartphone technology use in secondary schools as m-learning tools can keep teachers and learners connected in order to share learning resources. The literature revealed that smartphone use in teaching and learning context allows learners and educators to communicate frequently and also to share learning materials. 94.8% of the respondents said yes to the fact that smartphone technology use in secondary schools easily supports teacher/learner communication and sharing of learning materials, so the SMT members and educators have to support and allow the use of smartphone technology in schools.

Table 31

Table 31 represents the statement on whether using a smartphone for education is enjoyable.

Using the Smartphone for education is enjoyable					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	116	85.9	85.9	85.9
	No	4	3.0	3.0	88.9
	Undecided	15	11.1	11.1	100.0
	Total	135	100.0	100.0	

The question was designed to determine whether using the smartphone in secondary education will bring about fun and enjoyment in the learning context. Literature shows that students enjoy using their smartphones for learning especially in HE context where more research studies have been done. The majority of the responses were yes with 85.9% of the respondents supporting that education is enjoyable when using the smartphone. Therefore, the researcher believes that it is the role of the SMT members and educators to find strategies to use smartphone in secondary schools so that learning would be fun for learners.

Table 32

Table 32 represents the statement on whether smartphone mobility enhances learning anytime anywhere.

The mobility of the Smartphone enhances learning anytime anywhere

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	128	94.8	94.8	94.8
	No	4	3.0	3.0	97.8
	Undecided	3	2.2	2.2	100.0
	Total	135	100.0	100.0	

Question 29 of the survey was designed to check from the respondents whether the smartphone's mobility has a positive effect on its use as an m-learning tool in secondary schools. The smartphone's mobility easily promotes it as an m-learning tool in secondary schools. Responses indicated that 94.8% of the respondents view the smartphone's phone mobility in secondary schools as the way of promoting m-learning which supports learning anytime anywhere.

Table 33

Table 33 represents the statement on whether smartphones use easily connects teachers and learners to online learning resources.

A smartphone easily connects teachers and learners to online learning resources					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	132	97.8	97.8	97.8
	No	2	1.5	1.5	99.3
	Undecided	1	.7	.7	100.0
	Total	135	100.0	100.0	

Question 30 was asked to determine the respondents 'use of the smartphones to connect to online learning resources and share them with learners. Responses shows that 97.8% support the use of the smartphones to connect to online leaning resources and share with the learners. This indicates that through the use of the smartphone technology as a m-learning tool secondary, schools' educators can easily connect to online resources they are aware of as indicated in question 7, Section A and then share valuable information with learners.

Table 34

Table 34 represents the statement on whether important stakeholders in the education sector think that the smartphone can be used as a m-learning tool in secondary schools.

Important stakeholders in the education sector think that the smartphone can be used as a mobile learning tool in secondary schools					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	109	80.7	80.7	80.7
	No	7	5.2	5.2	85.9
	Undecided	19	14.1	14.1	100.0
	Total	135	100.0	100.0	

The question was asked to determine respondents' views and perceptions whether they are aligned to those of other stakeholders in education sector that smartphone technology can be used as an m-learning tool in secondary schools. Responses displayed that 80% said yes meaning their views are aligned to those of other stakeholders in the education sector. However, the researcher is of the idea that SMT members and educators have to promote and drive smartphone use in their secondary schools to support m-learning.

Table 35

Table 35 represents the statement on whether teachers and learners are addicted to their smartphones.

Teachers and learners are addicted to their smartphones					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	104	77.0	77.0	77.0
	No	7	5.2	5.2	82.2
	Undecided	24	17.8	17.8	100.0
	Total	135	100.0	100.0	

The question was designed to determine respondents' attitudes towards smartphone addiction. The responses revealed that 77% of the respondents believed that smartphone users become addicted to their smartphones, meaning they even use them during school hours, but not for education purposes Therefore, m-learning can be easily practiced in secondary schools because the attitude towards smartphones use is addictive.

Table 36

Table 36 represents the statement on whether m-learning is easily promoted using the smartphone technology.

Mobile learning is easily promoted using the smartphone technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	119	88.1	88.1	88.1
	No	2	1.5	1.5	89.6
	Undecided	14	10.4	10.4	100.0
	Total	135	100.0	100.0	

Question 33 of the questionnaire was asked to determine how m-learning can be infused and promoted in secondary schools. 88.1% of respondents said yes, the use of the smartphone technology can easily promote m-learning in secondary education. The reviewed literature indicate that the smartphone is the tool that easily support and enhance m-learning in different learning contexts.

Questionnaire: Section E

Section E of the questionnaire focused on assessing the respondents' role in promoting and supporting effective use of smartphones capabilities for m-learning tool in secondary schools The respondents' views, perceptions and experiences were explored. Section E had 10 question structured in a "Yes" or "No" scale (see appendix B for precise details of the questionnaire). Most responses from the 10 questions fell in the "Yes" category displaying willingness and readiness of the respondents to play a role in promoting and supporting smartphones as m-learning tools use in secondary schools. The literature reviewed assisted the researcher to have an insight on the questions to design for section E on understanding the views and perceptions of the respondents in determining their role in promoting and supporting effective use of smartphones capabilities for m-learning tool in secondary schools. Moreover, their readiness

and willingness in allowing learners to use smartphones capabilities to support m-learning in secondary schools.

Table 37

Table 37 represents the statement on whether taking pictures using a smartphone is useful for teaching and learning.

Taking pictures					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	62	45.9	45.9	45.9
	No	73	54.1	54.1	100.0
	Total	135	100.0	100.0	

The question was asked to indicate how respondents were willing to play a role in allowing secondary schools to use smartphone feature to enhance m-learning. 54.1% of the respondents said “No” indicating that taking pictures will not have much influence in their role to promote smartphone use as an m-learning tool in secondary schools.

Table 38

Table 38 represents the statement on whether documenting learning by writing using a smartphone is useful for teaching and learning.

Documenting learning by writing					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	93	68.9	68.9	68.9
	No	42	31.1	31.1	100.0
	Total	135	100.0	100.0	

The question was asked to indicate how respondents are willing to play a role in allowing secondary schools to use smartphone feature to enhance m-learning. 68.9% of the respondents

said “Yes” displaying that documenting learning by writing using the smartphone has an influence on their role in promoting smartphone use as an m-learning tool in secondary schools.

Table 39

Table 39 represents the statement on whether making vidoes using a smartphone is useful for teaching and learning.

Making videos					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	56	41.5	41.5	41.5
	No	79	58.5	58.5	100.0
	Total	135	100.0	100.0	

The question was asked to indicate how respondents were willing to play a role in allowing secondary schools to use smartphone features to enhance m-learning. 58.5% of the respondents said “No” indicating that making videos will not have much influence in their role to promote smartphone use as an m-learning tool in secondary schools.

Table 40

Table 40 represents the statement on whether doing assignment using a smartphone is useful for teaching and learning**.**

Doing assignments					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	119	88.1	88.1	88.1
	No	16	11.9	11.9	100.0
	Total	135	100.0	100.0	

The question was asked to indicate how respondents were willing to play a role in allowing secondary schools to use smartphone’s features to enhance m-learning. 88.1% of the respondents said “Yes” indicating that doing assignments using the smartphone technology has

an influence on their role in promoting smartphone use as an m-learning tool in secondary schools. For example, it's about how educators can use smartphone to post assignment for learners in a platform created by the school to support the use of smartphone as an m-learning tool.

Table 41

Table 41 represents the statement on whether searching for information using a smrtphone is useful for teaching and learning.

Searching for information					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	133	98.5	98.5	98.5
	No	2	1.5	1.5	100.0
	Total	135	100.0	100.0	

The question was asked to indicate how respondents are willing to play a role in allowing secondary school learners to use smartphone features to enhance m-learning. 98.5% of respondents indicated "Yes" indicating that searching for information using the smartphone technology has an influence on their role in promoting smartphone use as an m-learning tool in secondary schools. This exercise could easily generate more knowledge for both educators and learners on different subjects.

Table 42

Table 42 represents the statement on whether group work using a smartphone is useful for teaching and learning.

Group work					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	113	83.7	83.7	83.7
	No	22	16.3	16.3	100.0
	Total	135	100.0	100.0	

This question was asked to indicate how respondents were willing to play a role in allowing secondary schools to use smartphone features to enhance m-learning. 83.7% of respondents said “Yes” indicating that group work can be easily enhanced and supported using the smartphone technology. This has an influence on the SMT members and educators in determining their role in promoting smartphone use as an m-learning tool in secondary schools. The use of group work can help learners share knowledge on different subjects.

Table 43

Table 43 represents the statement on whether peer collaboration using a smartphone is useful for teaching and learning.

Peer collaboration					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	104	77.0	77.0	77.0
	No	31	23.0	23.0	100.0
	Total	135	100.0	100.0	

The question was asked to indicate how respondents were willing to play a role in allowing secondary schools to use this smartphone feature to enhance m-learning. 77% of respondents said “Yes” indicating that peer collaboration can be easily enhanced and supported using the smartphone technology. This has an influence in determining the role of both SMT members and educators in promoting smartphone use as an m-learning tool in secondary schools. This exercise could easily promote information sharing and new ways of doing things especially for learners.

Table 44

Table 44 represents the statement on whether getting feedback from the educator using a smartphone is useful for teaching and learning.

Getting feedback from the educator					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	114	84.4	84.4	84.4
	No	21	15.6	15.6	100.0
	Total	135	100.0	100.0	

The question was asked to indicate how respondents were willing to play a role in allowing secondary schools to use smartphone features to enhance m-learning. 84.4% of the respondents said "Yes" displaying that getting feedback from the educator can easily facilitate quick access to feedback using smartphone technology. This has an influence in determining role of SMT members and educators in promoting smartphone use as an m-learning tool in secondary schools. This exercise could easily help with access on feedback given to learners on the subject matter.

Table 45

Table 45 represents the statement on whether independent work using a smartphone is useful for teaching and learning.

Independent work					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	111	82.2	82.2	82.2
	No	24	17.8	17.8	100.0
	Total	135	100.0	100.0	

The question was asked to indicate how respondents were willing to play a role in allowing secondary schools to use this smartphone feature to enhance m-learning. 82.2% of the

respondents indicated “Yes” showing that independent work can be promoted using the smartphone technology to enhance m-learning in secondary schools. Therefore, the role of the SMT and teachers will be to promote the use of smartphone in secondary schools to promote independent work.

Table 46

Table 46 represents the statement on whether schools need to create an online learning management system to use smartphone is useful for teaching and learning.

Schools need to create an online learning management system supported by Smartphone Technology

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	126	93.3	93.3	93.3
	No	9	6.7	6.7	100.0
	Total	135	100.0	100.0	

The question was asked to indicate how respondents are willing to play a role in allowing secondary schools to use smartphone features to enhance m-learning. 93.3% said “Yes” displaying that creating an online Learning Management System supported (LMS) by the use of the smartphone technology can have an influence on the role played by SMT members and teachers in supporting smartphones as m-learning tools in secondary schools. The researcher believes that an LMS for each secondary school can easily promote smartphone use and m-learning in secondary schools. However, the respondents need training on the creation and maintenance of the LMS in schools.

4.4 Descriptive Statistics – Cross-Tabulation – contingency tables

Further analyses were performed using the association (chi-square test) for the first three objectives of the research study to understand the correlation between different variables. Therefore, the chi-square was done to determine the significant association between multiple

variables using a cross-tabulation method. The study results revealed some cross-tabulations between section A and the questions in the other sections in the questionnaire to examine data reliability. Cross-tabulations are an important tool for data analysis and statistical evaluation and are useful to study survey responses (Barghoorn, 1997). The idea of the researcher was to find the significant association between the items of the survey that best follow the objectives of the study and data reliability.

The objective 2 of the study was to determine the role that can be played by the DBE in promoting smartphones usage as m-learning tools in secondary schools in the KCD.

Table 47

Table 47 represents the results on the respondents' use of mobile devices for education purposes in secondary schools and statement B8.

		The DBE should train teachers on the use of smartphones as m-learning tools in secondary schools				
		Strongly agree	Agree	Uncertain	Strongly disagree	Total
My mobile device I use for education in secondary schools	Smartphone	61	21	2	2	86
	Tablet	3	1	1	0	5
	Both	9	16	1	0	26
	None	11	7	0	0	18
Total		84	45	4	2	135

The chi-square value is 0.02 which indicates that there is a significant association between the smartphone devices used by respondents for education purposes in secondary schools and the training that the DBE should provide in promoting smartphones use as m-learning tools.

The contingency table 47 revealed that irrespective of the mobile device the respondent uses for education there is a need for teachers to be trained on the use of smartphones as m-learning tools. The main reason behind this significant association would be that different instituttions

of learning are moving towards the 4IR where the use of mobile devices is imperative for the survival of their teaching and learning in the 21st century. Furthermore, most respondents use smartphones as the rightful tools for their education purposes. Therefore, this result is statistically significant revealing that objective 2 is achieved by revealing that there is a role that should be played by DBE in training educators on the use of smartphones as m-learning tools in secondary schools The training should be based on training needs of the secondary schools' SMT members and educators on amongst other things creating the LMS for their schools to promote and practice m-learning.

Table 48

Table 48 represents the results on the relationship between respondents' positions and statement C7

		Each secondary school requires a school policy according to the school context to promote smartphones as mobile learning tools				
		Strongly agree	Agree	Uncertain	Disagree	Total
Position	Principal	11	6	0	2	19
	Head of Department	18	19	1	0	38
	Educator	40	29	8	1	78
Total		69	54	9	3	135

The chi-square value is 0.052 which indicates that there is a significant association between the positions and the role of the SMT members and educators in secondary schools to design an internal policy according to the school's context for smartphones use as m-learning tools.

Contingengy table 48 revealed that irrespective of the position the respondents held at the secondary schools. Majority of the respondents agreed that each secondary schools may design their schools' policies on the use of smartphones as m-learning tools and to promote m-

learning. There is a policy by the Department of Basic Education on technology use in secondary schools but the policy seems generic in the types of technologies to be used for teaching and learning in secondary schools. However, there is no specific aspect in that policy that speaks to the use of smartphones as m-learning tools. Therefore, the respondents suggested that each school needs to be trained and designed policies for smartphones use as m-learning tools in secondary schools to promote m-learning. Therefore, the result is statistically significant revealing that objective 2 is reached by revealing that there is a role to be played by the SMT members and educators to design internal policies for secondary schools to promote smartphones use as m-learning tools. This implies that these policies will act as structures to guide and control smartphone use for teaching and learning purposes only in secondary schools.

The purpose of **objective 1 was to determine the** usefulness and effectiveness **of using the smartphone as an m-learning tool in secondary schools in the KCD.**

Table 49

Table 49 represents the results on the relationship between respondents' positions and statement C2

		Smartphone access and use should be promoted in secondary schools to enhance m-learning					
		Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	Total
Position	Principal	10	7	0	1	1	19
	Head of Department	11	26	1	0	0	38
	Educator	36	38	4	0	0	78
Total		57	71	5	1	1	135

The chi-square value is 0.016 which indicates that there is a significant association between the respondents' positions and secondary schools' access and use of smartphones as m-learning tools.

Contingency table 49 revealed that irrespective of the respondents' positions for secondary schools to promote m-learning, smartphones are effective tools to support m-learning. The study respondents revealed that they mostly preferred mobile technology device for m-learning in secondary schools is the smartphone. This result is statistically significant revealing that objective 1 is reached as respondents believe that the smartphone is the right tool for secondary schools to promote m-learning. The researcher is of the view that as teachers are the custodians of developing teaching and learning in schools this result indicates their readiness to promote smartphones use as m-learning tools in secondary schools.

Table 50

Table 50 represents the results on the relationship between the school location and smartphones usefulness as tools for m-learning in secondary schools and statement C1

		Smartphones are useful tools for m-learning in secondary schools					
		Strongly agree	Agree	Uncertain	Disagree	Strongly disagree	Total
School location	Urban	33	25	5	0	0	63
	Rural	31	38	0	2	1	72
Total		64	63	5	2	1	135

The chi-square value is 0.037 which indicates that there is a significant association between the respondents' school location and the smartphone's usefulness as m-learning tools in secondary schools.

Contingency table 50 revealed that irrespective of the schools' location the respondents indicated that smartphones are very useful tools for m-learning in secondary schools. The

respondents in secondary schools located in urban or rural areas believed that the smartphone is the most useful tool form-learning in secondary schools. The researcher is of the view that secondary schools need to find proper strategies and policies that enable the use of smartphones in schools as they are useful for m-learning. The results are statistically significant revealing that objective 1 is reached when the respondents find the smartphones useful tools for m-learning in secondary schools.

The purpose of objective 3 was to identify ways by which the SMT members and teachers can motivate learners to use smartphones effectively as m-learning tools in secondary schools in the KCD.

Table 51

Table 51 represents the results on the relationship between the position and more knowledge and content culd be generated if smartphones are used as m-learning tools statement C3

		More knowledge and content could be generated if smartphones are used as m-learning tools				
		Strongly agree	Agree	Uncertain	Disagree	Total
Position	Principal	9	8	0	2	19
	Head of Department	11	25	2	0	38
	Educator	40	30	7	1	78
Total		60	63	9	3	135

The chi-square value of 0.013 indicates that there is a significant association between the respondents' positions and generating more content and knowledge through the usage of smartphones as m-learning tools.

Contingency table 51 revealed that irrespective of the respondents' positions held in secondary schools the use of smartphones in secondary schools could generate more knowledge and

content through m-learning. This implies that secondary schools need to practice m-learning to enjoy more benefits of using the smartphone wherein content and knowledge could be shared anytime anywhere. The results are statistically significant revealing that objective 3 is reached when the respondents indicate that smartphone through m -learning generates more content and knowledge for both teachers and learners.

Table 52

Table 52 represents the results on the relationship between the repondents position and smartphone is an effective tool for using learning resources form the internet statement C7

		Smartphone is an effective tool for using learning resources from the internet				
		Strongly agree	Agree	Uncertain	Disagree	Total
Position	Principal	10	7	0	2	19
	Head of Department	15	22	1	0	38
	Educator	45	28	5	0	78
Total		70	57	6	2	135

The chi-square value of 0.005 indicates that there is a significant association between the respondents' positions and using the smartphone to access learning resources from the internet. Internet access to learning resources using the smartphone is one of the ways in which one can practice m-learning.

Contingency table 52 revealed that irrespective of the positions the respondents held at secondary schools' smartphones are the most effective tools for using learning resources from the internet. The respondents indicated that they use the smartphone to access learning materials via the internet in secondary schools, this could be used as building blocks in promoting and enhancing m-learning in secondary schools. The findings suggest that the use of smartphones to access learning materials via the internet is the building block of promoting

m-learning in secondary schools. The results are statistically significant revealing that objective 3 is reached when the respondents agree that smartphones can be used to access learning material on the internet.

4.5 Conclusion

The following chapter is the presentation of qualitative results. The nature of this research is a mixed-methods design. Therefore, it requires two sets of data results mixed to understand the research phenomenon. Hence, the first presentation of results was quantitative in nature the following presentation is qualitative, in an endeavour for the study to align itself with the explanatory sequential research design.

CHAPTER 5

PRESENTATION OF QUALITATIVE RESULTS

5.1 Introduction

In the previous chapter, quantitative data results were presented. This chapter entails the presentation of qualitative results collected by means of semi-structured interviews. In developing the first phase of results presented the research adopted the explanatory sequential design as discussed in the methodology chapter, the interview schedule was used to probe further. Thus, this chapter presents the results of data collected using semi-structured interviews for the purpose of collecting qualitative data. The qualitative study results are presented in themes generated from the responses of the semi-structured interviews.

This chapter is organised into four themes that were generated from the qualitative data collection phase.

Theme 1 is on training. The question asked were:

- Do principals and educators require training on smartphones as m-learning tools?
- What type of training needs are required by principals and educators to use smartphones as m-learning tools in secondary schools?

Theme 2 is on Mobile technology tools. The questions asked were:

- What is your preferable mobile technology tool for m-learning in secondary schools?
- How can smartphones be useful tools for m-learning in secondary schools?

Theme 3 is on m-learning. The questions asked were:

- What are other ways of infusing m-learning in secondary schools?
- How can secondary schools benefit from m-learning using the smartphone?

Theme 4 is on the motivational roles of the SMT members and educators on the use of smartphones as m-learning tools. The following were the questions asked:

What roles can be played by the SMT in guiding and promoting the effective use of smartphones in secondary schools as m-learning tools and how?

5.2 Phase Two: Qualitative data collection and analysis

Phase two of the study presents an analysis of data collected by means of semi-structured interviews. Purposive sampling technique was used in the qualitative data collection phase to select the sample of eight principals from the eight schools which were randomly sampled from the first phase of data collection which was quantitative in nature. The aim was to get in-depth answers to the research questions formulated and presented in chapter one. The research objectives were as follows:

- To explore the roles that can be played by the DBE in promoting smartphone usage as m-learning tools in secondary schools.
- To determine the effects of using smartphone as a m-learning tool in secondary schools.
- To identify ways by which the SMT can motivate learners of secondary schools to effectively use smartphone as m-learning tools.
- To develop and intervention model that can be employed in ensuring that smartphones are used as m-learning tool to improve teaching and learning in secondary schools.

5.3 Perception of Principals about the smartphone use as an m-learning tool in secondary schools

5.3.1 Data analysis process

The researcher used audiotapes to develop interview transcripts and notes in engaging in the process of qualitative data analysis. The participants' responses were classified into themes and patterns of thought stimulated from interview sessions. Morrill et al., (2000) opine that analysis

of text from interview transcripts and notes provides the researcher with an understanding of the participants' "reality" thought, feeling, and doing in a certain situation or time. Moreover, the breaking down of data into themes and patterns of thought assists the researcher in comparing and examining data to indicate similarities and differences (Kumar, 2000).

5.3.2 Presentation of data collected from the interview sessions

The study collected data from interviews conducted with principals in selected secondary schools at the King Cetshwayo District. Their responses are presented based on the interview schedule (see appendix C). Moreover, collected, interpreted and, analysed quantitative data (phase 1) shed a light on the themes to be used on the interview schedule.

- **Responses from the principals of the selected secondary schools on training needs required by principals and educators to use smartphones as m-learning tools in secondary schools.**

Theme 1 – Training and designing policies

Analysed quantitative data responses indicated that there are training needs and policy developments required to capacitate and guide the SMT members and educators on smartphones as m-learning tools in secondary schools. Below are various meanings presented by Principals "P" from selected secondary school on training needs and policy design/development for smartphones use as m-learning tools.

P 1: *The secondary education sector should provide training for the SMT and educators on using smartphones as m-learning tools, support this training with workshops and seminars on capacitating them with m-learning experiences and practices.*

P 2: *DBE must find ways on how they can assist the SMT on how smartphones should be used and train them on the use and safe keeping of smartphone as learning tools including policies,*

technical trainings, procedures on the safe use of smartphones as m-learning tools in secondary schools.

P 3: *DBE should provide all documentation, communication, and elementary trainings programmes for SMT and educators on the purpose of introducing smartphones use as m-learning tools in secondary schools, so that schools are ready to adopt this technology.*

P 4: *Secondary schools' management team and educators should be provided with required trainings, skills and resources to support and enhance m-learning, unlike our leaners they are familiar about smartphone technology use in social life.*

P 5: *SMT should be training and be knowledgeable about the purpose and benefits of using smartphones as tools for m-learning in secondary schools so that they may have a structure to use when guiding learners learning using the smartphone.*

P 6: *SMT and educators needs staff development programmes on embedding smartphone use in secondary schools as m-learning tools to provide them with the required skills and capacity to deliver teaching and learning using the smartphone*.

P 7: *We as the schools SMT requires resources such as manuals, policies, training programmes on promoting the use of smartphones in secondary schools as tools for m-learning, one or two members of the SMT has to be trained so that he or she could support and guide teachers who are willing to use smartphone technology as m-learning tools.*

P 8: *The role of the DBE could be to initiate trainings and capacity building programmes for SMT and educators to use m-learning as another vehicle of delivering teaching and learning in secondary schools, then mobile technologies can be seen as useful in schools.*

Types of training required

P 1: *This training should be professional development for SMT and educators across all subjects to support them in reforming the curriculum to be fully smartphone supportive because the devices is capable. A practical type of a training where there is a facilitator capacitating the SMT and educators on technical skills required to use smartphones as m-learning tools in secondary schools.*

P 2: *This training should be capacity building for the SMT on how to infuse mobile technologies such as the smartphones in secondary schools' education, during the training smartphones must be practical used to facilitate lessons.*

P 3: *The training must be done by one or two members of the SMT including the principal for them to be technology administrators and provide guidance for educators on how smartphones can be used as m-learning tools in secondary schools once they are trained and capacitated.*

P 4: *Training should be able to provide the SMT and educators with technical skills of using smartphones as m-learning tools and knowledge on how to design m-learning policies based on the schools' context and resources.*

P 5: *Practical and theory training is necessary for secondary schools to realise the dream of using smartphones as m-learning tools. Theory should stipulate the main aim of using these devices as learning tools in schools and the practical to deal with the how part of using these devices as m-learning tools.*

P 6*: The capacity development training on smartphone use as m-learning tools should provide principals and the SMT with technological skills and knowledge of how they could influence and guide educators in using smartphones as tools for learning in secondary schools.*

P 7: *Mobile technologies experts and advocates knows what type of skills and knowledge required by the SMT and educators to use smartphones as m-learning tools, so the DBE must let them design these trainings for secondary schools SMT and educators.*

P 8: *These trainings should provide knowledge and skills through workshops, seminars, support classes, manuals, and other resources on how educators and the SMT can enhance m-learning practice in secondary schools.*

How should the training take place?

P 1: *Workshops can be done for each district, possible for a period of 4 to 5 days.*

P 2: *Training programmes in a form of seminars for two or more members of the SMT including the principal and 5 to 6 days can be sufficient.*

P 3: *Workshops and classes during holidays and when learners are writing examinations can be used to capacitate the SMT on promoting and enhancing smartphones use as m-learning tools in schools.*

P 4: *I think an accredited training certificate should be provided by HE institutions for educators to be trained properly for the use of mobile technologies in secondary education if necessary.*

P 5: *Educators and SMT should be allowed to attend conferences based on themes of m-learning and be training for the technical part of using mobile technologies as m-learning tools, technological expert can reveal how long the training can be.*

P 6: *The training should provide the principals and the SMT with technical skills and theoretical knowledge of using smartphones as m-learning tools in a form of workshops and seminars and to take place during holidays so that it doesn't disturb schools' operations.*

P 7: *Training should be based on how educators can access, embed and share learning materials and resources to learners via the smartphone that could be a start using the schools' policies and technology management systems.*

P 8: *The DBE can provide training and workshops to the school's principal and the SMT on designing learning management systems for the schools that allows learners and educators to access schools' information and learning materials using mobile technologies.*

Based on the views of the principals the SMT and educators have little skills and capacity to use smartphones as m-learning tools in secondary schools. Understandably so, SMT and educators tend to design policies that ban and prohibit the use of smartphones in schools and classrooms. In doing so, they miss the benefits and opportunities provided by the smartphone as an m-learning tool. Therefore, training needs and policy design should guidelines should be prioritised by the DBE, so that SMT and educators can consider using the smartphone as m-learning tools in secondary schools. According to Norris, Hossian, and Soloway, (2011), one of the challenges of bringing technology use in schools is that either teachers are not provided sufficient professional development or they are not provided with the right essential technological tool. In as much as there has been little support on smartphone use in teaching and learning processes, the researcher believes that it has to be done through professional development of the SMT and teachers to realise the dream of fully using smartphones as m-learning tools in schools.

Additionally, comments from the principals of the selected secondary schools shed light on the type of training to be undertaken by the SMT and educators on smartphones use as m-learning tools in secondary schools. Participant stated that:

"The capacity development training on smartphone use as m-learning tools should provide principals and the SMT with technological skills and knowledge of how they could influence and guide educators in using smartphones as tools for learning in secondary schools."

The above comment shows this training should be done by SMT members and educators and be based on technological skills and theory of helping their schools to create and use Learning Management Systems for educators and learners to access learning materials and schools' information using smartphones. One of the key implementation plans for project Revolutionizing Education (RED) is to train principals via short courses on best practices and technology transformed learning (Norris, Hossian and Soloway, 2011). The researcher opines with project RED plans because training principals and SMT members in influencing the use of smartphones as m-learning tools in secondary schools is the best practice of guiding and promoting the use of mobile devices in our secondary schools. Therefore, SMT members must be provided with technical skills and knowledge of reforming and redesigning the access of the school's curriculum and information via the smartphone. These training needs must be theoretically and practically based on the use of smartphones as m-learning tools to capacitate the principals and SMT members in promoting and influencing the practice of m-learning in secondary schools.

Based on the principals comments it was revealed how the training should take place to suit the calendar and syllabus of the secondary schools and what the training should entail. One of the challenges of training in-service teachers and principals to promote the use of smartphones as m-learning tools in schools is the time required to train them. Training requires time, facilitators, preparation, venues, content etc. so that it can be fully beneficial (skills such as technical skill of using the device as a teaching and learning tool, technological skills, knowledge of reforming the subject content to fit the smartphones use as teaching and learning tools). Nevertheless, the DBE has been conducting trainings for in-services teachers and

principals in different contexts. Therefore, the training required for the SMT and principals to promote the use of smartphones as m-learning tools in secondary schools must follow the structure of the other trainings conducted. i.e. workshops, seminars, conferences, symposiums, etc.

Responses from the principals of the selected secondary schools on the effectiveness of the smartphone use as m-learning tool in secondary schools.

Theme 2: M-learning tools

On the provision of different mobile technology devices available to support m-learning. Quantitative data indicated that the smartphone is the most preferred mobile device to support m-learning in secondary schools. Below principals from selected secondary schools presented various reasons on choosing the smartphones as right tool for m-learning in secondary schools.

P 1: *Because of its availability to teachers and learners if used as an m-learning tool both can benefit i.e. access to information and communication can be quicker and always available to both learners and teachers using the smartphone.*

P 2: *Smartphones ownership is vast in urban and rural areas communities. As secondary schools' leaders it is our duty to find ways of effectively infusing smartphone technology use in our schools and treat them as resourceful tools not as a gadget that does not benefit learning.*

P 3: *it is easily movable, and the technological developments of the smartphones has made it more of a personal computer. Possibly as the SMT it times we make-up our minds and look into their use during school hours and in classes, for a start allow learners in the classroom to use them for searching information related to the lesson of the day.*

P 4: *Instead of carrying many books, one smartphone can have all the required learning material loaded such as notes, textbooks and rubrics for educators, it has become more of a computer then just a mobile phone.*

P 5: *Teaching and learning will be at our finger tips as teachers and learners if smartphones can be used in secondary schools as m-learning tools anytime and anywhere teaching and learning will be taking place.*

P 6: *The smartphone technology is very powerful in the 21st century, from its size, capabilities, user-friendly and mobility secondary schools can benefit in providing more opportunities of learning using mobile technologies.*

P 7: *Smartphones are very powerful tools when they are used proficiently, learners can have activities to assess themselves and enrich themselves with information related to their learning at their fingertips all the time.*

P 8: *Out of all mobile technologies I believe the smartphone can be the right tool for secondary schools to promote and enhance m-learning because it's fun and enjoyable to own and use the smartphone our learners can benefit.*

When can smartphones be used effectively as m-learning tools in secondary schools?

P 1: *In the classroom when the educator allows learners to search for more relevant information relating to the lesson topic.*

P 2: *When the schools' environment has been made suitable for mobile technologies to be part of the curriculum and learners, educators, communities and officials have a clear purpose of using this technology in schools to benefit teaching and learning.*

P 3: *Possibly anywhere in the school premises and beyond once there has been a proper guide on their use and learners and educators learning materials are made easily accessed on these devices.*

P 4: *During teaching and learning but they have to be programmed for that purpose only so that learners do not use it for other purposes during classroom sessions.*

P 5: *They are going to be more effective if they are used in the classroom as a learning device and they need to be always on good condition so that all learners can be at par with the educator and the content*.

P 6: *When the schools has created an environment that uses a learning management system that allows learners and teachers to connect to each other and their learning materials anytime and anywhere using the smartphone or tablets.*

P 7: *When the schools' leaders have provided strategies of influencing educators and learners to see benefits then disadvantages of using smartphones as learning tools*.

P 8: *Smartphones can be effectively used when leaners have to access the internet to gather more information and understand on the content of the lesson in the classroom but monitored.*

The responses of principals in selected secondary schools suggested that the smartphone is the most preferred tool by SMT and teachers to be used for m-learning in secondary schools. Smartphone use as a teaching and learning device entails having more time on tasks and activities relating to school work for both teachers and learners. Teaching and learning will have no boundaries because of the nature of the device in use., as a smartphone is a hand-held, internet-enabled device with specialised apps and it requires one hand to use (Mao, 2020, Bomhold, 2013). However, there are many challenges hampering their use in secondary

schools' education, this includes: professional development of staff, policies, infrastructure etc. Al-Hadithy and Ghosh (2013) opines that using a smartphone for education requires a comprehensive guide to access learning materials, educational videos, podcast and e-books. Nevertheless, studies of Mao (2020); Starkweather and Stowers (2009); Norris, Hossian and Soloway (2013) support the use of smartphone as the next potential tool for different educational context in the 21st century. Bulus (2020); Evanoff (2014) concurs that mobile devices are becoming an integral part of the schools' culture and, therefore, schools should adapt their policies to these changes.

Additionally, principals' comments show that the smartphone can be more effectively used in secondary schools when learners are searching for the information relevant to their lesson topic. It can also be used when the school environment has been made suitable for mobile devices use, and when schools have created their own Learning Management System fully supportive to smartphone use. The use of the smartphone also necessitates that both teachers and learners have access the internet. Mao (2020); Bomhold (2013) assert that that smartphone is perceived as a "easy" tool and requires little specialised knowledge and skills. Furthermore, Starkweather and Stowers (2009), believe that "we were all drawn to the student-outreach possibilities inherent in the new smartphone applications such as Twitter, Facebook, and Myspace". Therefore, the use of the smartphone depends on the access to the internet so as to provide users such as learners with many platforms related to teaching and learning.

Responses from the principals of the selected secondary schools on m-learning benefits as a learning platform in secondary schools.

Theme 3: M-learning in secondary schools

The main driver of promoting m-learning is the use of mobile technologies as tools to provide access to school-related information on teaching and learning. Both educators and learners can

benefit if m-learning is practiced as another way of promoting life-long learning because its communication is accurate and fast, access to learning materials is vast, access to new learning platforms using the internet brings more opportunities. Phase 1 which deals with quantitative data revealed that smartphones are the most prolific mobile devices that could promote m-learning in secondary schools. Below are various views of principals from selected secondary schools on how m-learning can be promoted and how can schools benefit from its use.

P 1: *Educators and learners can have access to teaching and learning material through m-learning which will reduce the cost of buying books and printing administrative documents required by schools.*

P 2: *Yes, schools can benefit from m-learning because learning material can be stored to mobile devices enabling teaching and learning even beyond the classroom.*

P 3: *M-learning provide access to learning resources at a finger tips, so this can benefit learners to have access to more information, knowledge, do more simulations, experiments and research on their smartphones.*

P 4: *There are more benefits that schools can enjoy if m-learning is implemented correctly, smartphones provide access to the internet which is a benefit on its own because its provide many platforms and access to learning material.*

P 5: *Full practice of m-learning in schools will provide skills and more knowledge of using mobile technologies as tools of teaching and learning as the 21st century schooling environment requires.*

P 6: *More benefits of m-learning are practical when the school environment provides required resources such as Wi-Fi, routers, structures and policies that influences smartphone technology use as m-learning tools and supports the use of mobile technologies*.

P 7: *M-learning practice in schools can be started and done more suitable for projects, assignments, field work (trips) and other searches using access to the internet via the smartphone.*

P 8: *The capabilities (access to the internet, GPS, clock, dairy, downloading apps) of mobile devices such as the smartphone makes m-learning to be more beneficiary to teachers and learners, so using smartphones schools can benefit immensely.*

The responses of the interviewed principals in selected secondary schools indicate that secondary schools must be ready to practice m-learning with the opportunities and benefits mentioned which m-learning brings for secondary education. Teachers and leaners will have access to their daily teaching and learning materials at their fingertips. Moreover, it will promote the teacher-leaner communication with no boundaries. Therefore, Statti and Villegas (2020); Charles (2012) suggest that for m-learning to be promoted and sustained educators and schools should come up with activities and mechanisms to permit learners to use these tools through structured and explicit instruction. The environment in which most m-learning studies have been conducted, showed the similarities on benefits of practicing m-learning, to enhance its availability and accessibility of information networks, engaging students in learning-related activities in diverse physical location, supporting of project-based group work, improving of communication and collaborative learning in the classroom, and enabling quick content delivery (El-Hussein & Cronje, 2010). However, the school environment must provide the required resources such as Wi-Fi, routers, structures and policies that influences smartphone technology use as m-learning tools. Olumadara, Kolabo and Esobi (2020), reveal that teachers in Sub-Saharan Africa have a high level of readiness to use mobile learning for instructional delivery. These findings are in line with the current study findings under objective 3 where the majority of respondents indicated that they are ready to start practising m-learning in the KCD secondary schools so as to promote leaners learning. Teachers alluded to the fact that

smartphones are the most preferred mobile technology for m-learning in secondary schools. Furthermore, mobile technologies enrich classroom settings and embraces effective students' participation in instructional processes (Olumadara, Kolabo &Esobi, 2020).

Responses from the principals of the selected secondary schools on the roles of the SMT to optimise smartphones use as m-learning tools in secondary schools.

Theme 4: Roles of the SMT to optimise smartphones use as m-learning tools.

Principals as the leaders of the SMT were asked to provide their views on the roles to be played by the SMT in promoting and optimising smartphones use as m-learning tools in schools. In secondary schools SMT is tasked to guide, control, coach, promote effective teaching and learning for the development of both learners and educators, and to promote technology use for teaching and learning. Responses from the principals of selected secondary schools in KCD are stated below:

P 1: *There should be a technological training first for one or two members of the SMT on how smartphones can be infuse as m-learning tools then their roles on influencing and guide smartphone use in schools can be clear.*

P 2: *Schools need to have technological administrators i.e. one or more SMT member trained to support, assist, guide, influence and promote other educators interest in using smartphones as m-learning tools in schools. Principals should be part of the trained administrator in smartphone technology use in schools.*

P 3: *One needs to fully understand the needs, reasons and benefits of infusing smartphones as m-learning tools in schools, then we can have a role to play in promoting and supporting educators and leaners in using this device as a learning material.*

P 4: *First and for most, the SMT must influence the school code of conduct to recognise smartphones as useful resources that could link teachers and learners to their teaching and learning material all the time.*

P 5: *Through the HoD the SMT can champion educators to have an assignment, activity, task that would allow learners to use smartphone technology in their learning that could be a start. I believe.*

P 6: *SMT needs staff development programmes that would provide them with more knowledge and strategies on what role they need to play to promote and influence smartphone technology as tools in schools.*

P 7: *SMT can grant, allow and guide educators in designing subject related projects that allows or requires the smartphone to be used as a learning material by learners. However, staff development is required.*

P 8: *We need technological administrators in schools to be part of the SMT so that we could be capacitated on promoting and using smartphone technology as a m-learning tools for our learners. They will provide guidance and coaching for educators who are willing and read to use this technology in teaching and learning.*

Folashade and Adeniyi (2017), explain that opportunities for learning abound and directed by adults, who assign, structure, choose tools, and champion for, manage those activities. The comments from the principals in selected secondary schools show that the roles of the SMT in promoting and guiding smartphones use in secondary schools as m-learning tools are not clear. However, they mentioned that the roles of the SMT should include, training that will highlight their roles in promoting smartphones use in schools, influence schools' policies to allow and guide the use of smartphones in schools, HoDs can encourage teachers in their departments to have smartphone-related activities for learners, schools also need technological administrators

to promote and guide the use of the smartphones in secondary schools. Mobile technologies use in schools poses demands on the contemporary principals to be technologically motivated to promote m-learning in schools. It is a requirement for the schools to have effective leadership and management to provide good learning opportunities for learners (Folashade and Adeniyi (2017), Kiggundra and Moorosi, 2011).

5.4 Joint displays

This section represents the combination of mixed methods results presentation through joint displays. Where triangulation of quantitative and qualitative results was merged to significantly indicated the mixing of phase one and phase two results. This table indicates an in-depth explanation and understanding of quantitative results from questionnaires using themes in the qualitative results obtained from the interviews. Table 53 represents the relationships and joint displays between the results of the quantitative phase and designing of questions in the interview guide for the qualitative data collection in phase two, while also indicating the rationale for collecting qualitative data to strength quantitative results.

Table 53

Table 53 represents the joint display and relationship of quantitative results and designing of interview questions.

Joint Displays: Explanatory Sequential design

Domains	**QUANTI. RESULTS**	**Semi-structure interview questions**	**Rationale for the question**
Training	95% of educators and principals indicated that DBE should provide training on smartphones use as m-learning tools.	What are the training needs required from the DBE? What type of training is required? When is the best time to do the training?	To determine the type of training needs required by SMT and educators to use smartphones as m-learning tools in secondary schools.
Tools	86% of educators and principals uses smartphones and tablets for education.	What is your preferred mobile device for m-learning in secondary schools? and why?	To determine the most preferred mobile device for educators and SMT to integrate m-

	96% of the study participants owns and use a smartphone.		learning in secondary schools.
M-learning	93% of educators and principals agreed that intervention by the DBE is needed to integrate m-learning in secondary schools using the smartphone	What are the ways of infusing m-learning in secondary schools? How can secondary schools benefit from m-learning?	To determine how m-learning can be practiced in secondary schools using smartphones.
Roles of the SMT in optimising smartphones use as m-learning tools	91% of educators and principals agreed that each secondary school requires a policy to promote smartphones use as m-learning tools.	What role can be played by the SMT and educators to promote smartphones use as m-learning tools in secondary schools?	To determine the role that can be played by the SMT in promoting smartphone technology use in secondary schools.

Table 54

Table 54 represents the relationships between quantitative results and qualitative results on joint display tables for objective 2.

Joint Displays: Results

Objective 2: To explore the roles that can be played by the Department of Basic Education in promoting smartphone usage as m-learning tools in secondary schools in King Cetshwayo District.

Domains	**QUANTI. Results**	**QUALI. Results**	**Recommended Intervention**
Training	95% of educators and principals indicated that DBE should provide training on smartphones use as m-learning tools.	P2: DBE must find ways on how they can assist the SMT on how smartphones should be used and train them on their use and safe keeping of smartphones as learning tools, including policies, technical training, and procedures on the safe use of	Trainings and professional development programmes through workshops, seminars and conferences for SMT and educators to be capacitated on the use and benefits of smartphones use and m-learning in secondary schools. Equipping the SMT

		smartphones as m-learning tools. P1: This training should be a professional development for SMT and educators across all subjects in supporting them in reforming the curriculum to be fully smartphone supportive.	and educators with technological skills and knowledge to use smartphones as m-learning tools.

Table 55

Table 55 represents the relationships between quantitative results and qualitative results on joint display tables for objective 1.

Objective 1: To determine the effects of using a smartphone as a m-learning tool in secondary schools in King Cetshwayo District.

Domain	QUANTI. Results	QUALI. Results	Recommended Intervention
Tools	86% of educators and principals uses smartphones and tablets for education. 96% of the participants own and use a smartphone.	P8: Out of all mobile technologies devices I believe the smartphone can be the right tool for secondary schools SMT and educators to promote and enhance m-learning because it's fun, enjoyable, to own and use the smartphone our learners can benefit. Instant access to the internet and relevant information knowledge makes the smartphones suitable tools for m-	SMT and educators to consider incorporating the smartphones as m-learning tools in secondary schools, as it is the most preferred tool for m-learning in secondary schools by educators and SMT.

		learning in secondary schools.	

Table 56

Table 56 represents the relationships between quantitative results and qualitative results on joint display tables for objective 3.

Objective 3: To identify ways by which the SMT can motivate learners of secondary schools to effectively use smartphone as a m-learning tool in King Cetshwayo District.

Domain	**QUANTI. Results**	**QUALI. Results**	**Recommended Intervention**
M-learning	93% of educators and principals agreed that interventions by the DBE are needed to integrate m-learning in secondary schools using the smartphone	P5: Full practice of m-learning in schools will provide skills and more knowledge for educators and learners if using mobile technologies as tools for teaching and learning in the 21st century schooling environment.	M-learning incorporation and practice in secondary schools using smartphones

Table 57

Table 57 represents the relationships between quantitative results and qualitative results on joint display tables for objective 4.

Objective 4: To design a model that can be employed in ensuring that smartphones are used as m-learning tools to improve teaching and learning in secondary schools in the KCD.

Domain	**QUANTI. Results**	**QUALI. Results**	**Recommended Intervention**
Roles of the SMT in optimising	91% of educators and principals agreed	P6: SMT needs professional staff	Clear roles of the SMT on influencing

smartphones use as m-learning tools in secondary schools.	that each secondary school requires a policy to promote smartphones use as m-learning tools.	development that will provide them with clear knowledge and strategies on what role they need to play to promote and influence smartphones use as m-learning tools in schools.	and incorporating smartphones in schools as m-learning tools should be highlighted.

Objective 4: To design a model that can be employed in ensuring that smartphones are used as m-learning tools to improve teaching and learning in secondary schools in the KCD.

In order to achieve objective 4, the study designed a model that could be employed in secondary schools for the purposes of using smartphone as m-learning tool. This model was designed from the findings of the study based on the three objectives. The main aim of designing the model is to support the adoption and use of smartphones as m-learning tools in secondary schools for the benefit of improving teaching and learning and to promote best m-learning practices for secondary schools in the KCD. The SMTs' perspectives shed light on how smartphones could be used as m-leaning tools in secondary schools. This implies that they are one of the important structure to influence and motivate the use of smartphones as m-learning tools by educators and learners to improve and support learners 'learning and performance.

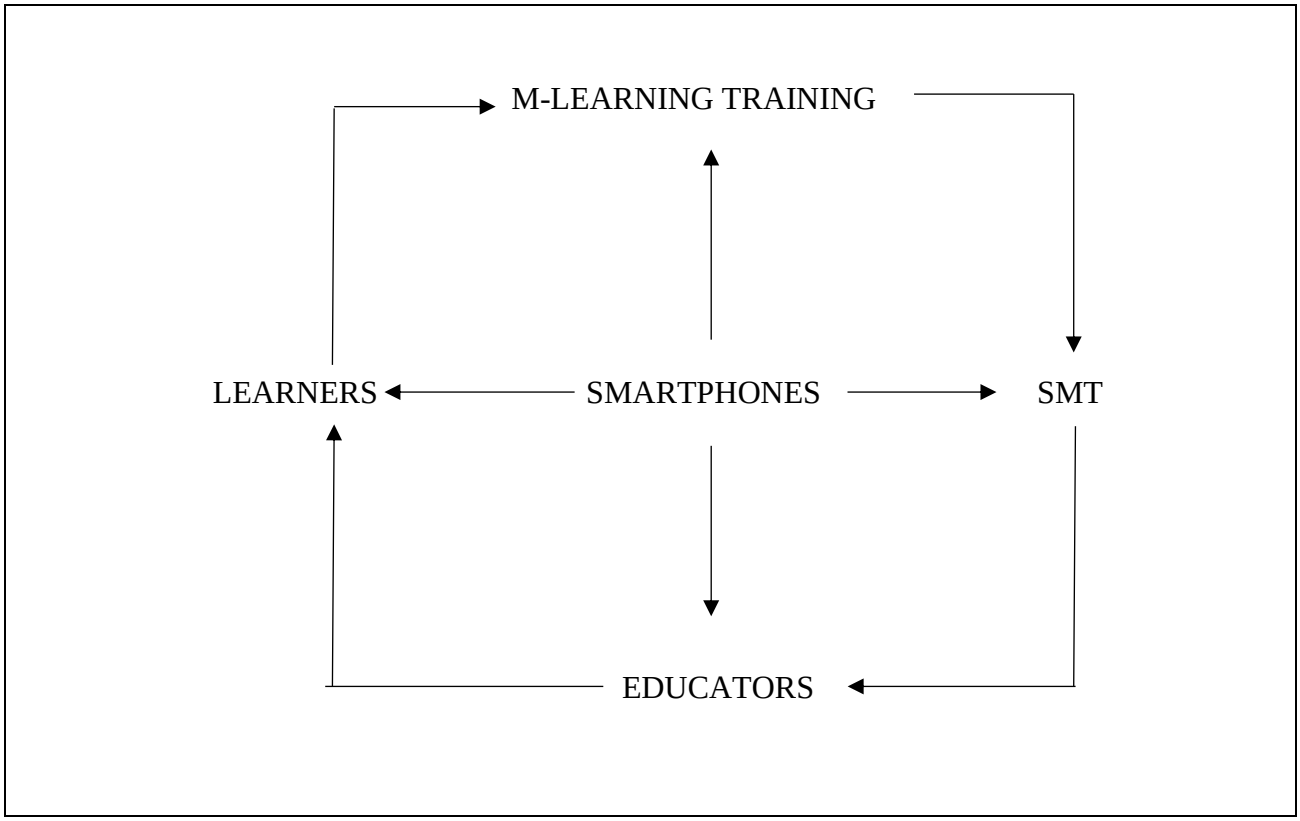


Figure 4. Smartphone use as m-learning tool in secondary school model

Smartphones: The introduction of the smartphone has taken all communities by storm every teacher and leaner seem to own one. The study findings revealed that educators would prefer the use of the smartphone as a m-learning tool in secondary schools in the KCD. The participants indicated that they prefer the use of smartphone because of its perceived ease of use and perceived usefulness. These two components perceived ease of use and perceived usefulness are part of the theory used to underpin the study which is the UTAUT. Furthermore, the SMT and educators revealed that they would like to receive staff development trainings on the use of smartphone as a m-learning tool in secondary schools.

M-learning training: Objective number three revealed the role that the DBE could play in promoting the usage of smartphones as m-learning tools in secondary schools. The study findings revealed that the SMT need to be trained and capacitated on the use of smartphones

as m-learning tools in secondary schools in the KCD. Furthermore, the findings of the study indicated the type of training that the DBE could offer to SMT members and educators in secondary schools in the KCD and how and when this training could be conducted. This training would provide mobile technological skills to the members of the SMT, in turn the SMT members in each secondary school can assist educators as technological administrators during the usage of smartphone as a m-learning tool. P 1: "*There should be a technological training first for one or two members of the SMT on how smartphones can be infuse as m-learning tools then their roles on influencing and guide smartphone use in schools can be clear.*" This is one of the views from the SMT (principals) on how m-learning training could be of benefit to secondary schools teaching and learning process for the better performance of learners.

SMT: The study focused on the perceptions and attitudes of the SMT members and educators as participants on the acceptance and use of smartphones as a m-learning tools in secondary school in the KCD. The study revealed that 86% of educators and principals uses smartphones and tablets for education purposes and 96% of the study participants own and use a smartphone. The SMT structure has a mandatory role to play in promoting effective teaching and learning in secondary schools using technologies. As leaders and managers of secondary schools it was important for this research to determine and explore how do these structures view the use of smartphones as m-learning tools in schools. How much influence do they have on the use and acceptance of smartphones as m-learning tools in secondary schools in the KCD? They have the influence to motivate the use of ICT in schools. They have a responsibility to influence educators and learners to use mobile technology appropriately for the benefit of teaching and learning. Therefore, the study findings revealed that they must be the first group to receive training as they are responsible for the leadership and management of secondary schools.

Educators: Teachers in secondary schools play a big role in promoting and influencing technology use for teaching and learning in secondary schools. They are the custodians of

promoting and delivering quality teaching and learning to learners. Therefore, their acceptance and use of smartphones as m-learning tools in secondary schools have a positive influence on the learners learning using the smartphone. The study findings revealed that staff development initiatives for the SMT and educators would have a positive influence on the promotion of the smartphone usage as m-learning tools in secondary schools in KCD. This implies that the one of the SMT's role especially after being trained is to influence and motivate educators on the usage of smartphones as m-learning tools in secondary schools at KCD. The training would benefit learners' learning using the smartphone, thus, having a positive influence on the performance of learners and provision of quality teaching and learning. The SMT would be capacitated as they would have a clear understand, knowledge and role on how they could influence, motivate and promote the use of smartphone as a m-learning tool in secondary school in the KCD.

Learners: The main aim of infusing technologies as teaching and learning tools is to promote and develop learners' performance. Majority of learners in secondary schools seem to own and uses smartphones for their social and personal benefits. Therefore, the acceptance and use of smartphones as m-learning tools in secondary schools by the SMT and educators would bring about positive influence on leaners use of these devices as m-learning tools in secondary schools. The use of smartphones could benefit learners as it can improve their performance, increase the pass rate and promote life-long learning.

5.7 Conclusion

This chapter presented the analysis of both quantitative and qualitative data, the former was collected through the use of a questionnaire and the former through the use of semi-structured interviews from SMT members and teachers in secondary schools in the King Cetshwayo District. Quantitative data was analysed using descriptive statistics, while the qualitative data

was analysed thematically to deepen the understanding of the study phenomenon from 8 principals of the selected secondary schools. Therefore, this study used mixed method design known as explanatory sequential design. The results were finally presented in tables indicating joint displays of both quantitative and qualitative results. The results indicated that the views of the SMT members and teachers in quantitative results are similar to those of the qualitative results presented by the principals. This suggest that the SMT and educators, and principals' views on training interventions required form the DBE to assist them in infusing smartphones as m-learning tools are similar. Moreover, qualitative results indicated the types training the secondary principals believe are needed to support SMT in influencing the use of smartphones as m-learning tools. The following chapter presents conclusion, of the study, summary of the findings, after which recommendations are made.

CHAPTER 6

SUMMARY, RECOMMENDATIONS, FUTURE RESEARCH AND RESEARCH EVALUATION

6.1 Introduction

The study presented chapter 1, 2, 3, 4 and 5, chapter 4 presented the quantitative results while chapter 5 presented the qualitative findings Since this research study involved two different phases, the data collection instruments were administered at different times. The questionnaire was administered first, followed by the semi-structured interviews, which were conducted to get an in-depth understanding on the perceptions and needs of the SMT on the adoption and use of smartphones as m-learning tools in secondary schools. In this chapter, the summary of the findings, recommendations, brief summary of the literature, research evaluation and future research is presented. The research objectives are reviewed, the recommendations are made in an endeavour to benefit other researchers who might be interested to research the use and adoption of smartphones as learning tools especially in secondary schools.

6.2 Summary of the study

6.2.1 Chapter 1

This chapter presented the introduction to this study, especially how the research unfolded from its inception to its execution. The chapter presented the review of relevant literature, methodology, data collection and, analysis strategies.

6.2.2 Chapter 2

The literature reviewed for this study was mainly based on journal articles, books, reports and government documents related to the use of mobile technologies such as the smartphone as m-learning tools in different types of learning institutions. Some of the literature was also based on m-learning and educational technologies driving teaching and learning in the 21st century.

Since there is more literature in the European context on smartphones use as m-learning tools for K-12 educational institutions, this study aimed at contributing more literature based in the African context. The study opted for the UTAUT as the theoretical framework that underpins the acceptance and technology use in different organizational settings.

6.2.3 Chapter 3

The study employed the mixed method approach and that resulted in joint findings on the use of smartphones as m-learning tools in selected secondary schools. Phase one of data collection and data analysis was quantitative in nature while phase two of data collection and data analysis was qualitative in nature. The results and findings imply an urgent need to grow awareness and knowledge among participating teachers towards the concept of m-learning and smartphone use as m-learning tools in secondary schools.

6.2.4 Chapter 4

This chapter presented the analysis and interpretation of quantitative data, which was the first phase of data collection. SPSS was used to analyse and interpret quantitative data, the quantitative analysis and interpretations informed the emerging of themes to be analysed and interpreted during the qualitative phase.

6.2.5 Chapter 5

This chapter presented the analysis and interpretation of qualitative data which was the second phase of data collection. Thematic analysis was used to analyse and interpret qualitative data. The qualitative analysis and interpretations informed the main findings of the study. The joint findings were also presented in this chapter.

6.3 Nature of the smartphone in education

The mobile phone phenomenon goes as far back as early 1970s, when first mobile phone was manufactured by Martin Copper and it was mainly used for sending and receiving text, and for

in-coming and out-going calls. As mobile technology advanced the first smartphone was manufactured and designed by Nokia. However, it sizes and its operating system posed challenges on its use and mobility to consumers. However, as years went by the improvements continued until the real "smart" smartphones were designed and produced by Apple, which was the iPhone; blackberry and other smartphones were produced thereafter. The smartphones are getting smarter on it size, OS used, have more capabilities which are similar to the ones of computers. Many industries including the advertising agencies, news, TV, social networking, printed books and the internet are moving towards the smartphone as the tool to facilitate their activities and reach their clients (Ahonen, 2008).

There are many challenges experienced by schools in using technology as an m-learning tool and one of the main challenges is the lack of technological tools to be used in schools (Bulus, 2020; Kafyulilo, Fisser & Voogt, 2016; Eickelmann, 2011). The lack of technological tools in secondary schools has caused educators to ignore technology use. However, the introduction of the smartphones in societies indicate opportunities and availability of other learning tools to be used in schools if directed and monitored correctly for learning. Therefore, secondary education officials need to view smartphones as powerful tools to eliminate this challenge and the device is mostly used for distance learning by Higher Education institutions. However, the manufacturers and designers of these mobile devices made them suitable for any type of education. According to Mobile Economy (2013) during the period of 2000 to 2012 there was rapid increase in the number of mobile phones produced around the world.

The 3G and 4G generation of mobile technology based on more advance technology are providing users with cheaper, smaller, more features and needed by most people including different institutions to support their services in the 21st century. Bulus (2020); Yu and Conway (2012) indicate that smartphones are increasingly becoming the ever-present penetration and transformation of everyday social practices and space. The mobile phones are no longer only a

tool for communication but a necessary instrument of individuals 'social and work life'. Most research on the use of smartphone for m-learning indicate that most users prefer smartphones over laptops and other movable wireless technologies for m-learning (Roberts and Spencer-Smith 2020, Godwin-Jones, 2011). The research study by Mao (2020), regard the smartphone as an enabler, as it influences how things are done. Therefore, the extent of technology advancements leads to changes in the education sector, so schools need to find ways of bringing in mobile technologies as m-learning tools in secondary schools.

6.4 M-Learning for secondary schools

M-learning practices enrich teaching and learning in different ways such as access to learning materials of all kinds. Additionally, mobile technologies advances have brought much additional opportunities for the new era of m-learning, bringing new possibilities and easily enriching the learning experiences of individual learners (Eteokleous and Ktoridou, 2009). These new experiences brought by the m-learning era are shaping learners to be ready for the 4IR and the 21st century workplace.

Hand-held mobile devices such as smartphones are set up as learning tools in different levels of education from the K12 to HE institutions especially in European and western countries (Statti & Villegas, 2020; Gaspard-Richards, 2020). They are used as an m-learning tools for both informal and formal learning contexts with learners of all age groups. In the African context, m-learning is mostly promoted in Higher Education institutions and is somehow overlooked in secondary education where teachers and learners can also benefit. Therefore, the current study explored the SMT's and educators 'perspectives and views on incorporating smartphones as m-learning tools at King Cetshwayo District secondary schools. For this research m-learning is simple defined as the utilisation of the smartphone for teaching and learning activity anytime, and anywhere.

Mao (2020); Franklin (2011) highlight that in using the smartphone for m-learning there is a potential to support different learning techniques such as: personalised, collaborative, contextual, life-long, ubiquitous and just-in time learning. During the COVID 19 pandemic most secondary schools were not operating, school days were shortened for learners which had a negative impact on teaching and learning and curriculum coverage. However, if m-learning practice was in place for all secondary schools in the country, teaching and learning would have continued like in most HE institutions in the country. Therefore, the researcher believes that there is a need for the SMT to find ways of incorporating m-learning in secondary schools using smartphones as tools for teaching and learning.

6.5 Preparations of secondary schools' educators for m-learning

Educators are one of the main role players in making sure that teaching and learning is of quality. Therefore, the use of technology as teaching and learning resources should first be promoted and supported by educators so that they can easily influence learners to adopt the use of technology during their learning. However, it is not clear what influence they have in promoting and supporting smartphones use as m-learning tools in secondary schools in the KCD, how much agency do they have in using smartphones as m-learning tools and as a resource in secondary schools. Nikolopoulou (2020); Mumtaz (2000), mentioned how IT use in schools have changed the role of educators in teaching and learning environment from the olden days. The above author stated that in modern teaching and learning environment educators are regarded as supporters and managers of learners' learning then being directors of student-focused activities (Nikolopoulou, 2020). However, the researcher is of the idea that for educators to provide quality and high standards of teaching and learning, they need to be capacitated in using the technology device in question.

There are factors that encourages the use of technology in schools which need to be understood in order to infuse more technological hardware and software applications to promote

technology use in schools. The factors include how teachers, leaners and the schools will benefit from using the smartphones as m-learning tools and also the advantages and disadvantages of using that software or hardware as a learning tool. The smartphone usage as a tool may easily promote collaborative group work among schools, educators and learners. Moodley et al., (2020), found that educators who are regular users of ICT in their teaching and learning showed confidence, motivation and that ICT is indeed useful in their classes. The school management has to encourage teachers' usage of technology with suitable strategies of (Kafyulilo, Fisser & Voogt, 2016). This study opines that SMT members and educators in the KCD secondary schools have a role to play in encouraging and introducing both educators and learners in smartphone usage as m-learning tool.

6.6 Roles of the SMT on technology usage in secondary schools

One of the main functions of the SMT in secondary schools is to improve teaching and learning environments, they do that through support of different activities to promote and improve schools' effectiveness and efficiency in teaching and learning. They have a duty to initiate, promote and develop new strategies and ways of infusing and supporting technology use in schools for the betterment of the teachers and learners use of the technology for teaching and learning purposes. Kafyulilo, Fisser and Voogt, (2016), revealed that most schools with technological resources lack support from SMT as some have never used technology in their teaching and learning. This results in demotivation of educators and learners in using their smartphones as tools for teaching and learning. SMT members in a democratic country are entrusted with the authority and responsibility to formulate and adopt school policies on the range of issues including the use of technology to improve learner performance (Mncube, 2009).

There are schools which are promoting the trend of smartphone use in schools as a e-learning tool through policies designed by the School Governing Body to guide and control smartphone

use for the betterment of teaching and learning in their schools (Parents 24, 2013). Therefore, the researcher is of the view that the SMT members and educators in secondary schools can come up with ideas on how smartphones can be supported and promoted as m-learning tools. The investigation into secondary schools SMTs' and educators' perspectives and experiences is to enable the rise on the use of smartphones as m-learning tools in schools.

Managers of today's knowledge where smartphone technology is part of the business tools are benefiting from the ubiquitous nature of the device. Schools books and other learning materials are at the learners' finger tips if they use smartphones as a tool to support curriculum implementation. Norman Henhilwood High principal David Millar, the advocate of smartphone uses in schools said "they must not be seen as a curse, but as an opportunity for improved learning and exploration (Parents24, 2013). Furthermore, Kirkman (2000), indicate that the adoption of technologies such as the smartphones in secondary schools as m-learning tools requires appropriate management strategies for its use as a tool for teaching and learning. The Department of Communications at the Western Cape led by Padaly Attwell took an initiative in capacitating school management team members by giving them tablets so that they can explore opportunities and potential of these mobile technologies devices in education (Parents24, 2013). Therefore, the researcher believes that the current study would be of assistance to the SMT members and educators in the secondary schools KCD to find ways of using mobile technologies in teaching and learning.

6.7 Summary of the findings based on objectives

In summary the findings of the study were aligned to each research objective to achieve the purpose of the study.

Objective 1: To determine the effects of using smartphone as a m-learning tool in secondary schools in KCD.

In line with objective 1 the quantitative results indicated that for smartphones to be useful and effective tools in secondary schools, both teachers and students should own and use smartphones for educational purposes. The quantitative data indicated that IT infrastructure such as Wi-Fi is required to support the use of mobile technologies as m-learning tools in secondary schools. Furthermore, the smartphone was regarded as the most preferred mobile technology to be used for educational purposes in secondary schools. In line with the quantitative findings, the qualitative data collected through the interviews shed more light on why the smartphone was the most preferred tool for m-learning because it increases accessibility, spontaneous communication, and ensures that learning can happen beyond the classroom. Majority of educators own and use smartphones for some educational purposes and they are aware about some online educational programmes such as SABC Education, so they believe that the smartphone is the right tool for m-learning in secondary schools. The participants also indicated that the use of smartphones as m-learning tools generates more content knowledge based on the subject matter. The SMT indicated that the effectiveness and usefulness of the smartphone access to the internet makes it the most reliable and useful tool for m-learning in secondary schools. However, there are currently no policies guiding the use of smartphones as m-learning tools in secondary schools in the King Cetshwayo District. Hence, the uses of smartphones as m-learning tools require infrastructures and resources such as WIFI spots and data for the easy use of smartphones as m-learning tools. Hence, the qualitative results of the study revealed that SMT in secondary schools has a role to design, support and promote the use of smartphones as m-learning tools depending on the context of the schools. The results also revealed that SMT requires interventions such as training in the

form of workshops and seminars from the DBE to promote and support educators' use of smartphones as m-learning tools.

Objective 2: To identify ways in which the SMT can motivate learners of secondary schools to effectively use smartphone as m-learning tool in KCD.

In line with objective 2 the quantitative phase results indicated that m-learning has to be promoted and supported in secondary schools. The results also indicated that SMT would appreciate comprehensive engagement in designing guidelines for best practice of m-learning in secondary schools in the KCD. On the other hand, the qualitative data alluded in details that there are no m-learning best practice guidelines for secondary schools, principals would like to be capacitated to formulate those guidelines. The whole world is facing the COVID 19 pandemic and hence, it is important that secondary school teachers find ways and strategies of promoting and supporting m-learning using the smartphone. Therefore, teaching and learning settings need new technology advancements to support and promote m-learning in secondary schools. Quantitative results also revealed that learning resources can be easily shared among teachers and learners, and they stay connected to each other for longer than in the classroom through m-learning. While the easier way to promote m-learning in secondary schools is the use of the smartphone, however, the lack of IT still poses a challenge. Additionally, qualitative findings revealed that the benefits of m-learning will assist the secondary schools from the cost of printing books, learning material, assignments, and some administrative documents needed by the schools. The other benefit would be that teaching and learning can be beyond the classroom which promotes life-long learning among teachers and learners.

Objective 3: To explore the roles that can be played by the DBE in promoting the use of smartphones as an m-learning tools in secondary schools in the KCD.

In fulfilling objective 3 of the study, questionnaires and interviews were conducted to understand the needs of the SMT and educators in using smartphones as m-learning tools. Quantitative results revealed that the SMT and educators would like to engage in more training that will help with the design of policies for the best practice of m-learning in secondary schools. While qualitative findings revealed the type of training needs they require and how this training can be implemented to capacitate SMT on smartphones use as m-learning tools. Both these results and findings were presented in chapter 4. Furthermore, responses of principals during the interviews were categorized into common themes for the gathering of in-depth information on crucial issues relating to the current study.

Objective 4: To design a model that can be employed in ensuring that smartphones are used as m-learning tools to improve teaching and learning in secondary schools in KCD.

In line with objective 4 the quantitative data revealed that there is a need of creating and designing an online Learning Management System (LMS) for each secondary school, as this could support the SMT's role in promoting and supporting the use smartphone use as m-learning tools. Therefore, the designing of an LMS for each secondary school can promote and support the SMT and educators to enhance group work, giving feedback as educators, allowing peer-collaboration, independent work, posting videos, accessing pictures related to learning etc. On the same objective 4, the qualitative finding revealed that each secondary school need SMT members to be trained on smartphone use as m-learning tools and be guided on their roles of influencing and motivating the use of smartphones in secondary schools. Therefore, each secondary school needs a technological administrator to support, assist, guide, influence and promote educators' interest in using smartphones as m-learning tools in schools.

6.8 Recommendations based on the objectives

This study combined quantitative and qualitative research approaches to address the research objectives. In determining and explaining the phenomenon of smartphones utilisation as m-learning tools in secondary schools in the KCD the following recommendations were made.

In relation to objective 3, which aimed to explore the roles that can be played by the DBE in promoting smartphone usage as m-learning tools in secondary schools in KCD.

- **Theme 1 - Training and designing policies**

The data collected from educators through questionnaires and semi-structured interviews indicated that participants need training on use of smartphones as m-learning tools. It is because SMT members and educators are not capacitated on the use of mobile technologies as m-learning tools in secondary schools. Therefore, if SMT members and educators are not capacitated on smartphones use schools suffer and not use smartphones to improve teaching and learning. Kafyulilo, Fisser and Voogt, (2016) findings showed that even schools with technological tools lack support and motivation from the school management, as such there are educators who never used technology in their teaching in such schools. Therefore, the required training will prepare, motivate and capacitate SMT members and educators in using smartphones as m-learning tools and how they could design policies that support best practices of m-learning in secondary schools in the KCD. Facilitating conditions as one of the constructs of the UTAUT, states that structures such as policies and facilitating conditions aspects such as training has to exist in an organisation to support the use of technology (Venkatesh et al., 2003; Venkatesh, Thong & Xu, 2013). The respondents referred to training and designing of policies as a requirement under facilitating conditions constructs to implement the use of smartphones as m-learning tools in secondary schools. The improvement of the infrastructure will provide conducive facilitating conditions for technology to be used in schools. If SMT members and educators are not trained and capacitated on the use of smartphones as m-learning

tools they can be easily excluded from the benefits of best m-learning practices, thus lacking one of the important skills in the 21st century. Chisango and Marongwe (2020); Black-Fuller (2016) opine that most in-service educators are not as skilled as they would like to be to incorporate the use of smartphones during the teaching and learning process. The role of the DBE will be to capacitate and provide training for educators in developing and supporting new initiatives and strategies of infusing mobile technologies in teaching and learning (McQuiggan et al, (2015); Yusri, Goodwin & Mooney, (2014); Ally, (2013); Al-Hadithy & Ghosh (2013).

The guidelines that teachers may need from the arranged workshops include their main roles, those of learners, and other stakeholders necessary to implement best practices of smartphones use as m-learning tools. Smartphones use as m-learning tools in schools falls in the category of ICT use in secondary school and GDE, (2011), opines that each public secondary school should develop its own ICT policy that covers curriculum delivery and promote the goals of ICT use in schools.

The type of training needs required.

Evident to the qualitative data collected which alluded further on the type of training required from the DBE by the SMT members and educators in the KCD, technological and technical skills must be part of the training as well as guidelines in designing policies for m-learning. This training will allow in-service educators to have technological skills and knowledge to use smartphones as m-learning tools in secondary schools and support learners on the use of these devices. The study's framework indicates that facilitating conditions are one of the key constructs in supporting and enhancing technology use in any organizational context. Therefore, a conducive technological environment on smartphones use need to be created so for educators to be motivated to use of this technology. Bulus (2020); Moodley et al., (2020); Tsotetsi et al, (2008) revealed that the lack of knowledge of technology use in education

especially in secondary schools' hampers ICT integration to teaching and learning leading to SMT members and educators avoiding, ignoring and neglecting issues related to technology use. Chisango and Marongwe (2020); Mumtaz (2000) support the above recommendations that secondary schools need educators who are specialist on ICT and have capacity in technological skills to assist learners to integrate technology into the curriculum. Training would develop teachers and principals in practicing m-learning for the benefits of learners and the school on infusing mobile technologies as tools rather than being just gadgets for communication.

Suggestion by participants on how to conduct training

From the qualitative data collected, the SMT explained ways of how training can be done. The participants explain that these trainings can be done in the form of workshops and seminars which can be offered during holidays so as not interfere with schools' operations. Ferry (2008) suggest that this type of training requires experts in mobile phones use for learning, and that training session need user-friendly manuals that would assist educators on fundamental issues of smartphones use as m-learning tools.

The DBE can take two or three SMT members for training to be specialists on m-learning using the smartphone. Blignaut, Hinostroza, Els, and Brun, (2010), state that over 60% of Chileans SMT members in secondary schools' priorities ICT infrastructural-related issues such as internet connectedness, bandwidth, and availability of digital resources to support effective teaching and learning. The trained SMT members can assist the school in designing their own Learner Management System (LMS) which could be used by the entire school for technologies such as smartphones as tools for educators and leaners. Therefore, once each secondary schools in the KCD has a trained SMT member, the smartphones as m-learning tools m-learning can be easily promoted and supported in each school in the KCD, and they can motivate other educators to use this technology. Moodley et al., (2020); Norris, Hossain, and Soloway (2011) state that one of the key implementation factor of project RED is to train principals and teachers

via short courses, in teacher by-in, best practices and technology transformed learning. The findings further indicated that the most suitable time for the training to take place is during the schools' holidays where educators find time and they are away from schools' activities. Therefore, organisers (DBE) should plan and implement these training around holidays.

Objective 1: To determine the effects of using smartphone as a m-learning tool in secondary school in KCD.

- **Theme 2 – Mobile technology tools**

The context of many secondary schools in the KCD is rural, which poses challenges such as the lack of technological tools for educators, to promote and enhance technology use for learning. Therefore, the unavailability of resources has been one of the challenges leading infusion of ICT in teaching and learning in most schools. However, through mobile technologies development the researcher believes that this lack of technological tools can be overcome by finding ways of using smartphones as m-learning tools in secondary schools. Moodley et al., (2020) explained that opportunities in learning and tools to be used are chosen by adults who manage teaching and learning activities. Therefore, it is in the hands of the SMT and educators to choose the right technological tools to be used for learning. The smartphone has been widely championed as the new driver of teaching and learning especially in rural-context because of its ubiquitous nature (Kukulska-Hulme, 2009). Additionally, Yu and Conway (2012) assert that smartphones are increasingly becoming the ever-present penetration and transformation of everyday social practices and space. Furthermore, the UTAUT focuses on the important phenomenon of technology acceptance and use, therefore in this study smartphones are the accepted tools for m-learning in secondary schools (Venkatesh, et, al. 2003)

Additionally, one of the UTAUT's constructs is social influence (Venkatesh et, al. 2003). Social influence is the extent to which a person perceives the importance of using a new technology information system through social influence (Venkatesh et, al. 2003). Furthermore, there is so much social influence on ownership and use of smartphones for social and educational reasons, and this social influence shapes how one uses the new technology. In gaining and transferring 21st century technological skills to learners, teachers need to be competent in using smartphones as m-learning tools. The 21st century type of a leaner is more attached to technology compared to the learners of the 19th century. Therefore, smartphones play an integral role in developing the 21st century workforce that is currently in secondary schools. Furthermore, learners need technological skills in preparation for them to study in higher education institutions where mobile technology use for learning is a necessity. It is of great importance that secondary schools' educators start exposing learners to smartphones for their learning activities. Additionally, the UTAUT framework has perceived usefulness as a factor that determines technology use and acceptance. Therefore, if educators perceive that smartphones are useful for secondary schools m-learning it likely that they sometimes use smartphones for education purposes in secondary schools.

In various types of mobile technologies manufactured, the smartphone has already set a precedence on being the mostly owned and used type by both adults and young people. Some of the adults own both smartphones and tablets for their personal use in secondary schools. However, one of the challenges is the availability of these tools in township and rural secondary schools, crime and theft also add to the problem. The acceptance of smartphones as m-learning tools in secondary schools will benefit both teachers and learners during the teaching and learning processes. Smartphones, has an influence on how things are done in the 21st century.

- **Effective use of smartphones in secondary schools**

The IT infrastructure is one of the most important aspect that needs to be improved to realise effectiveness of the smartphones use as m-learning tools in secondary schools**.** However, most educators own and use smartphones for teacher-related activities, such as searching for subject-related information from the internet. Kaliisa and Picard, (2017) revealed how the smartphones internet use has contributed to developing countries connectivity and access to uninterrupted connection. Technology Acceptance Model (TAM) is one of the models that informs the UTAUT (Venkatesh, et, al. 2003). The TAM has two constructs, such as perceived usefulness (PU) and perceived ease of use (PEOU) which are part of the UTAUT. The perceived usefulness of smartphones will influence effectiveness on its use as m-learning tools in secondary schools. Educators believe that the use of smartphones as m-learning tools will effectively enhance their job performance. The smartphone as an enabler provides different capabilities that can easily enhance teaching and learning in secondary schools from the administrative to pedagogical activities. Smartphones adoption in learning context provides affordable accessibility and spontaneous communication, so as to ensure that learning occurs beyond the classroom. The researcher believes that for smartphones to be used effectively technological platforms are required that allow learners and teachers to share information via mobile devices. It should be noted that the successful implementation of m-learning in HEs is as a result that most students are sponsored with data and other required resources to access the LMS, but, for secondary education there is no funding even for educators to buy laptops as working tools.

Objective 2: To identify ways in which the SMT members and teachers can motivate learners of secondary schools to effectively use smartphone as m-learning tools in the KCD.

- **Theme 3 - M-learning**

M-learning practice has been mostly adopted by Higher Education Institutions with less focus on how secondary schools have adopted m-learning to promote teaching and learning. Ndume, Songoro, and Kisanga (2020), Alexander (2004) view m-learning as any form of learning that happens when mediated through mobile devices. The adoption of m-learning by secondary schools in the teaching and learning process seeks to bring about some organizational changes such as enhancement of teaching and learning, and provision of resources, personnel skills development and infrastructure. Furthermore, online learning using mobile technologies has created opportunities for educators to start accepting and using m-learning for secondary schools' curriculum (Statti &Villegas, 2020). The organizational change and acceptance of m-learning will assist secondary schools in the KCD in reforming, developing and training both teachers and learners in accordance with the needs of the 21st century workforce and beyond. This is in line with Bulus (2020); Peter et al, (2013) who support the view that the availability of technological infrastructure enhances m-learning for educators and learners in different learning institutions.

However, Kaliisa and Picard (2017) use the UTAUT model in their study as a framework for the adoption of m-learning in African Higher Education institutions. Approximately 70% of UTAUT variances focuses on the technological systems use and adoption. Therefore, the study applied the UTAUT model for m-learning adoption by secondary schools' educators through the use of smartphone. The use of smartphones in secondary schools seek to enhance collaborative communication among educator-to-educator, and educator-to-learner. The mobilisation of m-learning for secondary schools is part of developing different strategies that

secondary schools can put in place to promote and enhance teaching and learning. Evidently most educational institutions require a Learning Management System (LMS) to fully practice m-learning and reap its benefits. Therefore, it is the role of the school leaders find ways and skills of how they can assist schools in developing LMS for educators and learners to fulfil the goal of m-learning in secondary schools. The adoption of LMS for each secondary schools can be framed around UTAUT the theory that underpins this research, with an aim to explore the use and acceptance of technology systems in different organisational contexts. M-learning practice for secondary schools is another strategy to develop more teaching and learning platforms for educators and learners. The use of the smartphones on m-learning provides three elements of mobility which are learner mobility, learning mobility, and technology mobility (El-Hussein & Cronje, 2010). The three elements work in relation to each other and are equally important and must be clearly understood for the implementation of m-learning in secondary schools using the smartphones. The mobility of the technology is provided by the use of mobile devices such as smartphones, as learners are able to access learning anytime and anywhere.

The practice and implementation of m-learning in secondary schools seek to increase the number of learners and educators' engagements in teaching and learning. This practice will influence also the time spent by educators and learners in learning which would also be beyond classroom walls. However, the most hindering aspect of m-learning practice in our township and rural secondary schools in the banning of mobile devices use in schools' premises as they are viewed as a disruptive (Krevitt, 2013). Therefore, this has led to educators and learners to not to be keen to use smartphones technology as m-learning tools in secondary schools. Meanwhile, other urban secondary schools in the country are vastly benefiting from the use and adoption of smartphones as m-learning tools. Bilos et al., (2017) found that m-learning has a brighter future in secondary education if mobile technologies such as smartphones are properly structured and used to support the teaching and the learning process. The

implementation of m-learning as a self-paced type of learning seeks to provide more opportunities for learners to be independent. The current research hopes to give insights on the requirements needed for the benefits of secondary schools in the KCD on the use of smartphones as m-learning tools. Once, m-learning is implemented, it will be easy for students and teachers to access learning materials electronically. Therefore, the use of the UTAUT as the framework of the study show that smartphones are viewed as the preferred tools to support and enhance m-learning in secondary schools. Furthermore, m-learning acceptance through the smartphone use seek to provide secondary schools with different platforms supported by m-learning such as e-learning, learner centred learning, life-long learning etc. To counter at the challenges experienced like the lack of infrastructure, donations are required from different stakeholders to support better education practice for secondary schools. For example, support from DBE, private companies, different government departments, entrepreneurs, network providers and other stakeholders.

Objective 4: To design a model that can be employed in ensuring that smartphones are used as m-learning tool to improve teaching and learning in secondary schools in KCD.

Theme 4: A model to ensure smartphone use so as to improve teaching and learning in secondary schools in the KCD.

The advancements on capabilities of mobile devices has made the smartphone the discovery tool for different activities in different organisational context. These advancements propagate the smartphones as a must own and use device in the modern society and workplace environments. Mao (2020); Webb (2010) state that these mobile phone applications (apps) were designed to save time and enable the user to do on the move what they work on at their desks. The availability of social media apps has made the smartphone a device that easily fast-track and support instant communication amongst youth and adults, learners and educators, managers and employees. Mao (2020); Ahmed (2016), opine that the smartphone technology

is emerging in different technologies such as cameras, phones, GPS, media players, wireless file sharing, internet, computing and many more. Social media platforms such as Facebook, WhatsApp and Twitter are easily accessed via the smartphones. Collaborative teaching and learning is one of the important function of schools, hence, smartphones provide access to required materials and enable teachers and learners from different schools to communicate to promote more information sharing and partnerships amongst schools. Social influence as one of the constructs in the UTAUT significantly influences the adoption of smartphones for m-learning. Perceived usefulness of the smartphones as a m-learning tools in secondary schools significantly influence the behavioural intention to use smartphones for learning purposes. Venkatesh (et al., 2003) defined social influence as the extent to which a person perceives that it is important to use a new information system through social influence. While behavioural intention determines the acceptance of smartphones use as m-learning tools which is part of Management Information Systems Venkatesh et al., (2003). A structured m-learning system or practice represents a Management Information System used for teaching and learning in educational institutions. However, the use of smartphones for m-learning requires unlimited access to the internet to realise the goal of m-learning using the smartphone. Unlimited access to the internet provides more benefits on smartphones use for both teachers and learners. Almost all capabilities of smartphones are allowed to be used for m-learning especially in HE institutions and educational institutions practicing distance learning. Therefore, the smartphone functionalities are as important as the device itself in promoting and enhancing m-learning. The resolutions and mega pixels of cameras in smartphones has advance taking clear pictures, of which pictures also play a major role in the teaching and learning process. Smartphones calculators are mostly used by educators and learners when they want quick mathematical answers. Mao (2020) indicate a wide range of functions offered by smartphones that include audio and video recording/streaming/calling, internet access, emailing and messaging via

multimedia messaging service (MMS) and short messaging service (SMS) options, of which all these function have a vital role to play in class.

6.8 Discussion

The developments of mobile technologies devices across many manufactures has led to the view of smartphones as important devices in any teaching and learning context. The use of smartphones as m-learning tools is more researched in Higher Education overlooking the secondary education context, where there is also the need of such devices to support the teaching and learning process through m-learning. However, there are studies such as that of Statti and Villegas (2020), which focused of grades K-12 use of mobile learning and current trends and practices. The study main findings indicated interventions such as training and professional development programmes through workshops, seminars and conferences for SMT and educators to be capacitated on the use and benefits of smartphones use and m-learning tools in secondary schools. Chisango and Marongwe (2020), state that training teachers and learners on how to use technology in teaching and learning would assist in overcoming challenges during difficulty times such as COVID-19. The capacitation of the SMT and educators with technological skills and knowledge to use smartphones as m-learning tools can promote and enhance different types of m-learning in secondary schools. Roberts and Spencer-Smith (2019); Ozdamli and Cavus (2011), suggest that the understanding and mastering of content and effective assessment strategies by educators are some of the important aspects of m-learning best practices. Therefore, the contribution of this research is on the acceptance of the use of smartphones as m-learning tools in secondary schools in the KCD where there have been few literatures on m-learning use for content and assessment in secondary schools' education. Chisango and Marongwe (2021); Moodley et al., (2020); Black-Fuller (2016) opine with the results revealed in this current study that educators need to be trained and capacitated on the required skills for the use of smartphones as m-learning tools. Facilitating conditions is

one of the UTAUT's construct, which support the study findings that training of the SMT and educators on the use of smartphones as m-learning tools is required for the successful adoption of smartphone as an m-learning tool (Venkatesh et al., (2003); Ahmed, Everett, & Turnbull, (2017). The training of the SMT and educators would result to conducive facilitating conditions for smartphones use and adoption as m-learning tools. Behavioural intention as the main component of the UTAUT has an impact on individual use of the smartphone as an m-learning tool (Venkatesh, et al., 2003). The SMT and educators in the study findings revealed positive attitude towards the use of smartphones as m-learning tools in secondary schools. Therefore, the study findings revealed that the lack of training is one of the barriers for educators and SMT members to promote the implementation of smartphones as m-learning tools in secondary schools in the KCD. One of the recommendations is that the current study findings could be used by the Department of Basic Education in developing strategies for SMT members and educators to use so as to promote the use of smartphones as m-learning tools in secondary schools.

Furthermore, many teachers in high schools saw mobile devices as useful tools and tried incorporating them in their lessons (Moodley, et al., 2020; Black-Fuller, 2016). The SMT is an important structure in schools to develop, support and integrate technologies use as resources for learning. South African secondary education context seems not to have clear policies on the use of smartphones in schools, but does allow secondary schools principals to monitor and facilitate the correct use of mobile technologies in their secondary schools for teaching and learning (Parents24, 2013). Therefore, understanding and determining SMT members and educators' views on the acceptance and adoption of smartphones as m-learning tools paves a path for the development and provision of required resources for educators to use these devices in secondary schools as useful tools for teaching and learning.

Advancements in mobile technologies such as smartphones are leading educational institutions to find benefits and opportunities in these devices for teaching and learning purposes. The overall findings suggest that young educators recognise the need and importance of smartphones technology as an essential tool for educational use in secondary schools. They indicated that they do not have a negative attitude towards smartphones adoption in secondary schools as m-learning tools. According to Bulus (2020), the smartphone was the best tool preferred by teachers through which to disseminate information and collaborate with other teachers and learners in sharing learning material and other ideas relating to curriculum implementation and coverage. Therefore, the objective 2 findings on both quantitative and qualitative phases of the study revealed that the SMT members and educators considered smartphones as the best mobile technological tools for teaching and learning in secondary schools to support and enhance learner performance. This is supported by the effort expectancy component in the UTAUT (Ahmed, Everett, & Turnbull, 2017) which state that ease of use is a foundation of adopting and accepting smartphones technology use as m-learning tools. Therefore, SMT and educators indicated that they do use smartphones for some of their educational activities and they find it easy to use. Furthermore, one of the other components of the UTAUT which is performance expectancy "the level of individual user who believes that using the smartphone as m-learning tool in secondary school will help enhance his/her performance" (Venkatesh et al., 2003:). In the current research findings, majority of the respondents indicated that:

- Smartphone use would be useful for in secondary schools to promote and enhance m-learning.
- Smartphone use would provide quick access to facilitate m-learning in secondary schools.

Therefore, the lack of ICT appropriate resources in the secondary schools' context pave the way for the smartphone adoption as the appropriate resource for m-learning in secondary schools. The component of facilitating conditions in the theory that underpins this study implies that appropriate organisational resources for the SMT and educators have to be in place for smartphones use as m-learning tools in secondary schools. Therefore, the DBE's starting point could be to train SMT and educators on using smartphones as m-learning tools and provide secondary schools with resources such as Wi-Fi for connectivity purposes. Furthermore, smartphones use as m-learning tools would eradicate geographical borders in the secondary schools learning environment through group interactions. Collaboration and quick sharing of information as one of the benefits of m-learning among secondary schools would promote vast engagements among educators and learners in secondary education.

Educators and SMT in 10 selected secondary schools in the KCD, highlighted that they are users of smartphones as m-learning tools at their personal level and have accepted the smartphone as the preferred tool for m-learning, of which that is in line with the effort expectancy principle of the UTAUT (Venkatesh et al., 2003). The third findings of this research study revealed that there is a need for m-learning incorporation and practice in secondary schools using smartphones to benefit the teaching and learning process for secondary schools. Additionally, the third findings of the study are also supported by the principle of facilitating conditions of the UTAUT (Venkatesh, et al., 2003) by revealing that for secondary schools to fully incorporate and best practice m-learning, appropriate technological resources and infrastructure must be in place. Statti and Villegas (2020), opine that the UTAUT could be employed as the lens to accept m-learning as a learning system in grades K-12. This implies that if m-learning incorporation and practice is not taken seriously in secondary schools, it would be difficult if not possible to produce learners who will be able to compete globally. Therefore, this study generated views about m-learning practice using the smartphones from

the perspectives of the educators' secondary schools. The secondary schools' educators need to be technologically developed and capacitated with required skills for them to use smartphones as m-learning tools. The most commonly used approach to m-learning is based on using mobile devices such as smartphones to access e-Learning resources and systems such as Moodle an LMS used in different Institutions of Learning, these kind of eLearning systems are seldom found in secondary schools. Learning through the smartphone has withered the old ways of learning and has brought in approaches needed in the 21st century.

The UTAUT (Venkantesh, et al., 2003) final component which is referred to as user acceptance proved to be a major factor as to why the SMT members and educators preferred smartphones as m-learning tools in secondary schools in the KCD. Therefore, UTAUT major components such as performance expectancy, effort expectancy, social factors, and facilitating conditions has positive impact on the attitudes of the SMT and educators' acceptance and use of smartphones as m-learning tools. Furthermore, perceived usefulness and perceived ease of use played a crucial role in determining the acceptance and use of smartphones as m-learning tools in secondary schools by the SMT members and educators. Hence, the study main findings revealed that in maximising smartphones use as m-learning tools the SMT members and educators have to be trained and guided by clear policies and supporting systems in an endeavour to use smartphones as m-learning tools. The determining factor in using smartphones as m-learning tools in secondary schools is based on the educators' acceptance, adoption and use of this technology (Bulus, 2020; Moodley, et al., 2020). Additionally, m-learning and online learning is the mechanism to create new and more effective method for secondary schools to educating learners but it seems like not all schools are ready to implement m-learning because of different challenges. In the study by Mutambara and Bayaga (2020) it was revealed that m-learning has the potential to improve learners' performance in STEM provided that there are enough resources. Therefore, facilitating conditions concerning the

infrastructure and resources in majority of secondary schools hinders the successful implementation of m-learning using the smartphones in schools. This opines with the findings of the current research which revealed lack of tools and infrastructure are challenges in the implementation of m-learning in schools.

Although the current research did not focus on the other factors such as theft, crime, maintenance and cost needed for data bundles required for m-learning using the smartphone to be possible, however, the researcher is aware of these challenges in the implementation of m-learning in schools.

In achieving objective 4 the study findings revealed that the SMT members and educators require clear roles either from the DBE or the school leadership on what they need to do to influence the incorporation of smartphones as m-learning tools in secondary schools. This is supported by the social influence component of the UTAUT (Venkatesh, et al., 2003) which states that subjective norms of the SMT members and educators have a significant influence on the adoption of smartphones technology as m-learning tools in secondary schools. Therefore, the DBE and secondary schools' leader's approval of smartphones use as m-learning would provide clearly defined roles of the SMT members and educators. Furthermore, ownership and availability of smartphones as potential tools for m-learning in secondary schools have a direct social influence of their use as m-learning tools (Bulus, 2020). However, the SMT members and educators do not have clearly defined roles and functions on how to promote and enhance smartphones use as potential m-learning tools in secondary schools. The SMT members and educators need to fully understand and adhere to their roles to influence and promote smartphones use as m-learning tools and view the smartphones as essential learning resources. Therefore, the availability of the LMS for each secondary schools could provide a manual which stipulates the roles of the SMT members and educators in using e-learning systems effectively and efficiently using the smartphone technology. The provision of

LMS manual would provide the SMT and educators with guidelines and policies on the use of mobile technologies as learning tools in secondary schools. However, the lack of the ICT knowledge, lack of staff development on the use of mobile technologies, lack of resources, equipment needed for effective m-learning are some of the challenges faced by educators in implementing ICT in educational settings (Bulus, 2020). Nevertheless, the acceptance of smartphones as potential m-learning tools for secondary schools in the KCD by SMT members and educators indicate their willingness and readiness to adopt smartphones as m-learning tools in secondary schools in the KCD. Additionally, the current study designed a model to assist in the acceptance and use of smartphone as m-learning tool in secondary schools by SMT members and educators in the KCD. This model has five components which are, smartphones, m-learning training, SMT, educators and leaners. The model indicates how SMT training on smartphones use as m-learning tools, could influence and motivate educators to improve learners' performance using the smartphone as an m-learning tool. Furthermore, this implies that if the model is employed in secondary schools in the KCD, it could promote best practice of m-learning to the educators, and learners to become life-long citizens because of the advantages and opportunities brought by smartphone use as a m-learning tool.

6.9 Recommendations for future research and research evaluation

There are many factors to be taken into consideration when ICT has to be integrated in secondary schools. They include the educator readiness, their willingness and capabilities on the use of the technology, learner readiness and willingness on the use of the technology, availability of the technology to be used, internet provision, crime, guidelines and policies on the use of the technology, and other challenges. However, this study focused on the SMT and educators' readiness, willingness and development on the use of smartphones as m-learning in secondary schools. As the context of using smartphones as m-learning tools varies, future research work could explore on appropriate context for smartphones use in secondary schools.

In training educators to adopt and use smartphones in the context of classroom teaching and learning in various contexts and also through various activities. Further research could focus on secondary schools' learners and surrounding communities' readiness and willingness in using smartphones as m-learning tools in secondary schools.

The current study focused to smartphone technology availability and how the smartphone technology has been developed to suit learning for secondary schools. Future research studies could focus on other mobile technologies use in secondary schools such as tablets as m-learning tools. However, for the researcher the SMT and educators were viewed as the main players in the adoption and use of smartphones as m-learning tools in secondary schools. Therefore, the insights and lenses of SMT and educators were used to understand how and what needs to be in place for secondary schools to adopt m-learning using smartphones in the KCD. The preparation and training of educators to adopt mobile technology in secondary schools in KCD is an obstacle in the use of mobile technologies as resources and platforms for teaching and learning. Furthermore, structural guidelines and policies were indicated as the challenges in supporting and enhancing the use of smartphones as m-learning tools. Therefore, SMT and educators indicated the training needs they require from the DBE as support systems that could allow smooth adoption of smartphones as m-learning tools for secondary schools.

Further studies could look into how urban based secondary schools adopt and use smartphones as m-learning tools to assist the improvement of learner performance. Furthermore, the other research could be on how DBE can collaborate with the Department of Communications and networks providers such as Vodacom and MTN to provide resources that could be of benefit to secondary schools in using smartphones as m-learning tools. More future research for secondary schools lie in the development and designing of teaching and learning materials to be accessed via the smartphones technology. Therefore, future research could be able to assist

educators on designing learner-centred activities because learning using mobile technologies in more learner-centred than teacher-centred. Further research could also look into the pedagogical aspects of using the smartphone as a m-learning tool in secondary schools. This could be a useful research that focus directly on how teachers can use smartphones to teach learners so as to improve learners' performance.

6.10 Conclusion

As societies continue to interact in the world shaped by mobile technologies advancements efforts are required to integrate these devices in the education sector. M-learning is the driver of the new learning approaches which are aligned to the 21st century, therefore, government, societies, researchers, schools, educators and learners need to rethinking how these mobile technologies can benefit secondary education sector as vital resources of teaching and learning. Smartphones use as m-learning tools provide collaborative interaction between teachers and learners, access to information and learning resources which provide independent and life-long learning. In the 21st century smartphones are essential tools for the teaching trade, so leaners need dedicated SMT members and educators to create a conducive learning environment that allows them to use smartphones as learning tools in schools. Therefore, m-learning practice in secondary schools requires e-learning platforms such as Learning Management Systems (LMS) which will provide learning content developed for smartphones use, where the role of the educator will be to upload material and monitor learners through these platforms. However, this current research revealed that staff development initiatives and clear policies are required to capacitate educators on the use of smartphones as m-learning tools for secondary schools. This research focused on the behavioural intention of the SMT members and educators on the use of smartphones as m-learning tools in secondary schools. However, their behavioural intention on the use of smartphones as m-learning tools in secondary schools is affected by the

facilitating conditions and them being prepared for m-learning through training mainly by the DBE. It was the use of the UTAUT framework which underpinned this study which was focused on the acceptance of smartphones as m-learning tools in secondary schools by the SMT members and educators in the KCD. The participants further indicated their training needs so that they are equipped with knowledge and skills to promote and enhance the use of smartphones use as m-learning tools for secondary schools in the KCD. The offering of training by DBE is of vital importance to the education sector at large in realising the best practices of m-learning in secondary schools, which could result in continuation of teaching and learning even during pandemic times.

7. 0 References

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ANNEXURES

ANNEXURE A

UNIVERSITY OF ZULULAND

University of Zululand, Private Bag X1001, KwaDlangezwa, 3886
W: www.unizulu.ac.za

UNIVERSITY OF ZULULAND

D.Ed - Social Sciences Education

Researcher: Mr Mokoena S (0796066831)

Supervisor: Prof Gamede BT (0827342454)

Co-Supervisor: Dr Uleanya C (0746872730)

Dear Respondent,

INFORMED CONSENT LETTER

My name is Mokoena Sello (student number 20021952) I am a Doctoral student in the Department of Social Sciences Education, Faculty of Education, Discipline of Education at the University of Zululand. You are invited to participate in a research project entitled: **Utilization of Smartphones as a M-Learning tool in Secondary Schools at King Cetshwayo District: SMT members and educators Perspective.**

I am hereby seeking your consent to provide responses for this project by attending to the statements in the questionnaire**.** Through your participation I hope;

Objective 1 – to determine the effects of using a smartphone as a m-learning tool in secondary school in King Cetshwayo District

Objective 2 - to identify ways by which the SMT can motivate learners of secondary schools to effectively use smartphone as a m-learning tool in King Cetshwayo District.

Objective 3 - to explore the roles that can be played by the Department of Basic Education in promoting smartphone usage as m-learning tools in secondary schools in King Cetshwayo District.

Objective 4 - to design a model that can be employed in ensuring that smartphones are used as m-learning tool to improve teaching and learning in secondary schools in King Cetshwayo District.

The findings of this study will contribute to knowledge by providing firstly the tool to motivate m-learning practice via the smartphone in secondary schools. Secondly, insights on how DBE can assist secondary schools in the KCD to promote m-learning. Lastly the effects of smartphone use in secondary schools as a m-learning tool.

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence(s). There will be no monetary gain for participating in this research project. Confidentiality and anonymity of records identifying you as a participant will be maintained by the researcher. If you have any question(s) or concern(s) about participating in this study, please contact me or my supervisor at the numbers listed above. It will take you about 5 - 15 minutes to complete the questionnaire. I hope you will take the time to complete the questionnaire.

Sincerely,

Researcher's signature___  _Date__04/04/2022___

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University of Zululand, Private Bag X1001, KwaDlangezwa, 3886
W: www.unizulu.ac.za

ANNEXURE B

Sello Mokoena, Email: mokoenas@unizulu.ac.za, Contacts: cell phone- 0796066831 – At work – 0359026758, Office no. 07, CEEL BUILDING, University of Zululand

Faculty of Education

Private Bag x1001

kwaDlangezwa

3886

Information Sheet for SMT members and Educators in Secondary Schools at King Cetswayo District

Title: Utilization of Smartphones as M-Learning Tools in Secondary Schools at King Cestwayo District: School Management Team Members and Educators Perspective.

I am a Ph.D. candidate at the Faculty of Education, University of Zululand, South Africa. I am doing my Ph.D. research under Prof. BT Gamede and Dr. C Chinaza. My research aims at finding how SMT in Secondary Schools perceive these tools with regard to their ease of use and effectiveness as learning material.

The main aim of this project is to design a model to promote m-learning in secondary schools through the SMT influence as leaders of schools' development in teaching and learning. Therefore, as the SMT member I would like to invite you to participate in this study. In the study I will give you a questionnaire.

You are requested to take this survey only once on paper, because it will be provided to you at your school premises. The researcher will collect them same time after filling the survey.

The survey

The survey will ask your age, gender, educational qualification, position, job experience and your smartphone/tablets owned. Further it will ask you about your perceptions and experiences on the use and functions of smartphones as m-learning tools in secondary education. Moreover, you will be asked about advantages and disadvantages of using smartphones as m-learning tools in secondary schools to enhance / promote education. Lastly, how often you use your smartphone for educational purposes. The duration time to complete the survey is estimated at 25 minutes, this could be conducted during your free time.

Please note that the participation in this study is voluntary, and if you participate you have a right to withdraw from the project at any time without any penalty or prior permission. Therefore, if you withdraw I promise to remove any information relating to you if this is possible. Your identity, name and address will never be documented there would be a particular care for to ensure privacy of all data collected for this study.

Any questions about the study do not hesitate to contact me at the details I have provided above. Concerning complains about the study you can also contact the project supervisor Dr. B.T Gamede at GamedeBT@unizulu.ac.za or concerning anything with regard to the project.

If you agree to participate in the study, please fill out the consent form. I am looking forward to work with you.

*Smartphone is a mobile phone with more advanced computing capability and connectivity than basic feature phones such as media player, digital camera, GPS navigation, touchscreen computer, web browsing, Wi-Fi, and you are able to download apps as customise it according to your needs.

Consent form

☐	**By checking this box, I hereby agree to participate in this study**
☐	**I have read the information letter and understand that all the information collected will only be accessed by the researcher and his supervisors and that it will be kept confidential and secure for a minimum period of 5 years following completion of the project and then destroyed I understand that the data may be used for publication**
☐	**I have read the information sheet and understand what will be required of me if I participate in this project**
☐	**I understand names will not be used in this research**
☐	**I understand that my participation in this study is voluntary, and that if I do participate I have the right to withdraw from the study at any time without penalty. If I withdraw, the researcher will do his best to remove any information relating to me, provided this is practically achievable.**
☐	**I would like to receive a report of the study to be sent to me …….. *(indicate your preferred email address)***
☐	**I understand that if I have any question about the study, I can contact the researcher via the details that he has provided above. If I have a complain about the study, I may contact either the researcher (S MOKOENA) or the supervisor of the project (Dr. BT GAMEDE) at the provided emails on the letter**
☐	**By checking this box, I hereby agree to participate in this study**

ANNEXURE C

A QUESTIONNIARE ON USING SMARTPHONES FOR LEARNING (M-LEARNING)

Section A – Biographical Information

Mark with an X

PERSONAL DETAILS

0.1 Gender	1	Male		2	Female	

0.2 Age	

0.3 Position

1	Principal	
2	Head of Department	
3	Educator	

0.4 Job experience (in years)

0 – 5 yrs.	6 -10 yrs.	11 – 15 yrs.	16 – 20 yrs.	20 yrs. and above
1	2	3	4	5

0.5 I own a smartphone / tablet

1	Smartphone
2	Tablet
3	Both
4	None

0.6 My mobile device I for education in secondary schools.

1	Smartphone
2	Tablet
3	Both
4	None

0.7 I am aware of the following secondary education online learning resources for learners/Educators

1	FUNducation
2	SABC Education
3	Thutong National Education Portal
4	Teacherpedia
5	Maths Excellence
6	Maths Online
7	TEACHA

8	Sci-Bono GDE Learners Downloads
9	2Enable
10	Vodacom e-school
11	South African History online

0.8 School location

1	Urban
2	Rural

Section B – Theme 1: Needs the DBE can provide in promoting the smartphone use

How much do you agree on the roles of the DBE in promoting smartphone use as m-learning tool in secondary school's education?

[Simply mark with an X in the appropriate box of your choice: (**SA** = Strongly Agree; **A** = Agree; **U** = Uncertain (not sure); **D** = Disagree; **SD** = Strongly Disagree)

STATEMENTS	**SA**	**A**	**U**	**D**	**SD**
1.1 Supporting infrastructures such as WIFI spots in secondary schools enhances smartphone use as m-learning tools should be provided by the DBE.	1	2	3	4	5
1.2 There should be DBE policies in place for use of smartphones for teaching and learning in secondary schools.	1	2	3	4	5
1.3 DBE can support long-life learning by promoting smartphone use as m-learning tools in secondary schools.	1	2	3	4	5
1.4 DBE should allow and support strategies for each secondary school on the use of smartphones as m-learning tools outside classroom environment in secondary schools.	1	2	3	4	5
1.5 The DBE should provide more mobile devices like the smartphone to promote m-learning in secondary schools.	1	2	3	4	5
1.6 There should be initiatives from the DBE to enable the smooth integration of m-learning in secondary schools.	1	2	3	4	5
1.7 It is the role of the DBE to motivate, enhance and promoting teachers and learners to use mobile technologies	1	2	3	4	5

such as smartphones in secondary schools as learning aids.					
1.8 The DBE should train teachers on the use of smartphones as learning tools in secondary schools to promote m-learning.	1	2	3	4	5

SECTION C – Theme 2: Promotion of smartphone use in secondary schools

How much do you agree on the promotion of smartphone use as m-learning tools in secondary school's education?

[Simply mark with an X in the appropriate box of your choice: (**SA** = Strongly Agree; **A** = Agree; **U** = Uncertain (not sure); **D** = Disagree; **SD** = Strongly Disagree)

STATEMENTS	SA	A	U	D	SD
1.1 Smartphones are useful tools for m-learning in secondary schools.	1	2	3	4	5
1.2 Smartphone access should be promoted in secondary schools to enhance m-learning.	1	2	3	4	5
1.3 More knowledge and content is generated if smartphones are used as m-learning tools in secondary schools.	1	2	3	4	5
1.4 Smartphone use enhances teaching and learning in secondary schools.	1	2	3	4	5
1.5 In appropriate use of smartphone in secondary schools' destructs teaching and learning.	1	2	3	4	5
1.6 Each secondary school requires a school policy according to the school's context to promote smartphones use as m-learning tools.	1	2	3	4	5
1.7 Smartphone is an effective tool for using learning resources from the internet.	1	2	3	4	5

Section D – Theme 3: Essence of m-learning in secondary schools using the smartphone.

How do you rate the effects of smartphones use as m-learning tools in secondary schools' education for following reasons?

[Simply mark with an X in the appropriate box of your choice: (Yes, No, and Undecided)]

STATEMENTS	Yes	No	Undecided
1.1 Smartphone technology has brought about advancements in teaching and learning settings.	1	2	3

1.2 Smartphone technology use allows learners and educators to stay connected with each other to share learning resources.	1	2	3
1.3 Using the smartphone for education is enjoyable.	1	2	3
1.4 The mobility of the smartphone enhances learning anytime and anywhere.	1	2	3
1.5 A smartphone use easily connects teachers and learners to online learning resources.	1	2	3
1.6 Important stakeholders in the secondary education sector think that the smartphone can be used as m-learning tools.	1	2	3
1.7 Teachers and learners are addicted to their smartphones.	1	2	3
1.8 M-learning is easily promoted using the smartphone technology.	1	2	3

Section E – Theme 4: Motivational role of the SMT to the use of smartphones

How would you motivate and allow your learners to utilize smartphones as m-learning tools in secondary schools?

(Please choose all that apply)

STATEMENTS	Yes	No
1.1 I allow taking pictures	1	2
1.2 I allow documenting learning by writing.	1	2
1.3 I allow making videos of the lesson.	1	2
1.4 I allow doing assignments using the smartphone to search for information.	1	2
1.5 I allow them to search information using the smartphone.	1	2
1.6 I allow group work to be done using the smartphone.	1	2
1.7 I allow peer collaboration and sharing of the information using the smartphone	1	2
1.8 I allow learners to get feedback from the educator via their smartphones.	1	2
1.9 I allow learners to do independent work	1	2
1.10 Schools should be allowed to create their own independent online management systems supported by the smartphone technology use.	1	2

Thank you very much for taking time to completing this questionnaire

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ANNEXURE D

QUESTIONS ON THE USE OF SMARTPHONES AS M-LEARNING TOOLS IN SECONDARY SCHOOLS

Supervisor: Prof BT Gamede **Student: S Mokoena**

Co- supervisor: Dr Chinaza

THEME 1 – to explore the roles that can be played by the Department of Basic Education in promoting smartphone usage as m-learning tools in secondary schools in King Cetshwayo District.

What roles could be put in place by DoBE to assist SMT in planning and designing new approaches to use smartphones as m-learning tools in secondary schools?

Do teachers and learners require training on the use of smartphones as m-learning tools in secondary schools? If yes suggest the type of training required

THEME 2 – to determine the effects of using a smartphone as a m-learning tool in secondary school in King Cetshwayo District

How can smartphones be a useful m-learning tools in secondary schools?

When / how can a smartphone be used effectively as m-learning tool in secondary schools' premises?

THEME 3 – to identify ways by which the SMT can motivate learners of secondary schools to effectively use smartphone as a m-learning tool in King Cetshwayo District.

How can secondary schools benefit from using smartphones as m-learning tools?

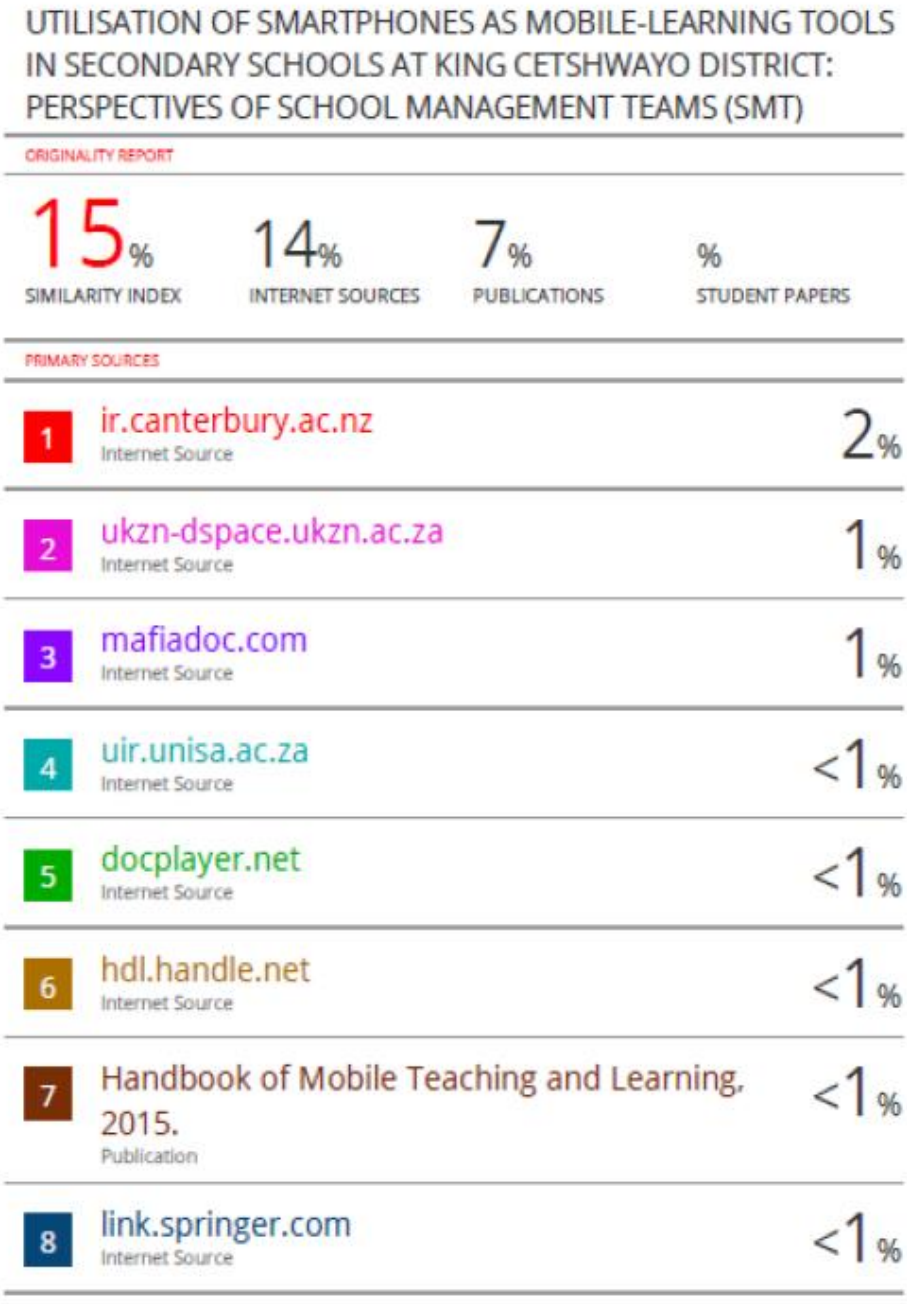
What smartphones capabilities can be useful for teaching and learning in secondary schools?

THEME 4 – to design a model that can be employed in ensuring that smartphones are used as m-learning tool to improve teaching and learning in secondary schools in King Cetshwayo District.

Can secondary schools design their own model (s) / policies/ approaches to support effective use of smartphones as m-learning tools? Give an example

What could be the best practice of effective use of smartphones as m-learning tools for secondary schools.

ANNEXURE E



UTILISATION OF SMARTPHONES AS MOBILE-LEARNING TOOLS IN SECONDARY SCHOOLS AT KING CETSHWAYO DISTRICT: PERSPECTIVES OF SCHOOL MANAGEMENT TEAMS (SMT)

ORIGINALITY REPORT

15%	14%	7%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	ir.canterbury.ac.nz Internet Source	2%
2	ukzn-dspace.ukzn.ac.za Internet Source	1%
3	mafiadoc.com Internet Source	1%
4	uir.unisa.ac.za Internet Source	<1%
5	docplayer.net Internet Source	<1%
6	hdl.handle.net Internet Source	<1%
7	Handbook of Mobile Teaching and Learning, 2015. Publication	<1%
8	link.springer.com Internet Source	<1%

ANNEXURE F

UNIVERSITY OF ZULULAND
RESEARCH ETHICS COMMITTEE
(Reg No: UZREC 171110-030)

RESEARCH & INNOVATION
Website: http://www.unizulu.ac.za
Private Bag X1001
KwaDlangezwa 3886
Tel: 035 902 6324/6374
Email: MangeleS@unizulu.ac.za/
MkwanaziMM@unizulu.ac.za

ETHICAL CLEARANCE CERTIFICATE

Certificate Number	**UZREC 171110-030 PGD 2018/581**								
Project Title	**Utilization of Smartphones as M-learning Tools in Secondary Schools at King Cetshwayo District: Perspective of the School Management Teams (SMT)**								
Principal Researcher/ Investigator	S Mokoena								
Supervisor and Co-supervisor	Prof B.T Gamede		Dr C Uleanya						
Department	Social Sciences								
Faculty	Education								
Type of Risk	Medium Risk – Data collection from people								
Nature of Project	Honours/4th Year		Master's		**Doctoral**	x	Departmental		

The University of Zululand's Research Ethics Committee (UZREC) hereby gives ethical renewal approval in respect of the undertakings contained in the above-mentioned project. This approval is extended for another 1 year. The Researcher may therefore continue with data collection as from the date of this Certificate, using the certificate number indicated above.

SPECIAL CONDITIONS: **(1) This certificate is valid for 1 year from the date of issue.**
(2) Principal researcher must provide an annual report to the UZREC in the prescribed format [due date- 10 December 2022]
(3) The UZREC must be informed immediately of any material change in the conditions or undertakings mentioned in the documents that were presented to the meeting.
(4) Under the Protection of Personal Information Act, 04 of 2013 ("POPIA"), researchers have a general legal duty to protect information they process. They must ensure the security and protection of any personal information processed through the research and provide a compliant and consistent approach to data protection. The information collected via interviews must be for research purposes only. No personal information such as opinions, views and academic background may be linked to the respondents' identity or shared with anyone for marketing purposes or otherwise.

The UZREC wishes the researcher well in conducting research.

Prof. Nokuthula Kunene
Chairperson: University Research Ethics Committee
Deputy Vice-Chancellor: Research & Innovation
10 December 2021

CHAIRPERSON
UNIVERSITY OF ZULULAND RESEARCH
ETHICS COMMITTEE (UZREC)
REG NO: UZREC 171110-30
10 12
RESEARCH & INNOVATION OFFICE

ANNEXURE G

EDITING CERTIFICATE

This is to certify that I edited **Mokoena S** thesis for the degree of the Doctor of Education (Social Sciences Education) in the **Faculty of Education** at the University of Zululand. The thesis is titled: **UTILISATION OF SMARTPHONES AS MOBILE-LEARNING TOOLS IN SECONDARY SCHOOLS AT KING CETSHWAYO DISTRICT: PERSPECTIVES OF SCHOOL MANAGEMENT TEAM MEMBERS AND EDUCATORS**

N.P. Khumalo: Doctor of Education (UNISA)

Editing for Professionals (Wits)

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