An investigation on mobile technology adaptation in private schools

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Submitted in partial fulfilment of the requirements for the Degree Magister Educationis in the Faculty of Education, University of Pretoria

Supervisor

Dr M. Mihai

AUGUST 2019

DECLARATION

I declare that the dissertation, which I hereby submit for the degree of Magister Educationis at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

ETHICAL CLEARANCE CERTIFICATE

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This Ethics Clearance Certificate should be read in conjunction with the Integrated Declaration Form (D08) which specifies details regarding:

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The author, whose name appears on the title page of this dissertation, has obtained, for the research described in this work, the applicable research ethics approval. The author declares that she has observed the ethical standards required in terms of the University of Pretoria's Code of ethics for researchers and the Policy guidelines responsible for research.

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"Be strong and courageous. Do not be afraid; do not be discouraged for the Lord your God is with you wherever you go." – Joshua 1:9

ABSTRACT

Mobile technology has become an important tool to use in many private schools. Private schools are increasingly finding new and exciting ways to use mobile technology to facilitate teaching and learning. The purpose of this study was to investigate how teachers in private schools adapt to using mobile technology in their teaching and learning. It aimed at finding out whether mobile technology has aided them in their teaching and whether they find it beneficial to use.

A qualitative research approach was used which included collecting data from semi-structured interviews and reviewing lesson plans provided by the participants. This aimed at finding teachers' perceptions and views on their adaptation to the use of mobile technology. The population included eight high school teachers from three different private schools situated in Centurion, Gauteng. Selection of the population and sample was based on the teachers' use of mobile technology in their teaching and their willingness to participate in the study. Atlas.ti was used to analyse the data, which are presented through descriptions and illustrations.

This study found that teachers had a positive perspective on using mobile technology in their teaching. Many of the teachers found that using mobile technology improved their teaching and that learners improved their learning. Through sufficient training and involvement by schools' IT (information technology) departments, teachers showed an interest in finding a variety of ways to use mobile technology in their teaching. Another finding revealed that teachers need to adapt to using mobile technology as it is advancing at a rapid pace.

KEYWORDS: Mobile technology, adaptation, private schools, teacher perceptions, qualitative case studies, challenges, LTSM.

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27 August 2019

LANGUAGE EDITING CERTIFICATE

I, the undersigned, hereby certify that I have conducted the language editing and reference verification of the dissertation of **Samukelisiwe Thandazile Dvuba.**

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

The main purpose of this study was to investigate private school teachers' adaptation to the use of mobile technology in the classroom and in their teaching. Mobile technology has become a significant tool to use in the classroom and has transformed education in a variety of ways (Keengwe & Bhargava, 2014). It is important that this tool is designed and executed in a way in which it is relevant to not only the social context but the cultural context of learning too (Keengwe & Bhargava, 2014). Teachers need to successfully implement mobile technology in their classrooms in a way that benefits not only the learner but the development of the teacher as a whole (Sánchez-Prieto, Olmos-Migueláñez & García-Peñalvo, 2016). Therefore, this study investigated how teachers use mobile technology in the classroom and whether they find it easy or challenging to adapt to using it in their teaching.

Many researchers have investigated the potential influence that mobile technology has on teacher development, moving the focus away from the value of mobile learning for learners (Baran, 2014). In the past few years the integration of mobile technology in formal education has become a growing interest (Sánchez-Prieto et al., 2016). One of the main results of successful technology integration is the teacher's competence and ability to use mobile technology and shape it in such a way that it will meet the learning needs of the learners (Gorder, 2008). Gorder (2008) states that there are several teachers who are uncomfortable with the active learning and skills integration of mobile technology. Her study focused on the perceptions that teachers had when using technology in the classroom and how they were integrating technology in the classroom. There are similarities between her study and my investigation; however, the focus of my study was on the adaptation to specifically mobile technology in the classroom.

1.2 BACKGROUND

Teachers and leaners are able to access any type of information, wherever they are, using handheld mobile devices. Due to the increase in accessibility, mobile technology has a huge potential for classroom integration (O'Bannon & Thomas, 2014). Mobile technology has become a new tool that teachers can use and integrate in their teaching and learning. However, many teachers do not have the technological skills to successfully integrate these devices in their teaching practice. More research on teachers' perceptions of how they use technology and the easiness of this use will provide an insight as to how teachers adapt to using technology.

Many private schools have introduced mobile technology as part of their teaching and learning. These schools have informed parents of the new IT (information technology) strategies and that they want to enable them to be ahead in the digital era by becoming a paperless school (Hlugwane, 2015). Wireless networks are used to provide access to mobile technology in all the classrooms. However, there is not much research done on how teachers in these private schools have adapted to using mobile technology and what challenges they have faced since introducing mobile technology in their schools.

Private schools in Centurion, Gauteng, were approached to participate in this investigation, where teachers who use mobile technology in the classroom were interviewed. Seeing that private schools were the first schools to introduce mobile technology in their classrooms, this study provided an overview on how they have adapted since the introduction of this technology and whether the teachers saw it as beneficial towards teaching and learning in their classrooms. This study may be beneficial to other schools that want to implement and introduce the use of mobile technology in their classrooms. It may provide a better understanding of how to adapt successfully to mobile technology and how to address the challenges that teachers face when using it.

1.3 RESEARCH FOCUS

1.3.1 Rationale

The rationale for this study was concerned with investigating how teachers in private schools adapt to and use mobile technology in their teaching and learning. Several schools have introduced mobile technology in their classrooms to assist them to achieve learning outcomes. Private schools, being the first schools to introduce mobile technology in their schools, have been able to adapt to using mobile technology as part of their teaching and learning; however, adapting to the use of mobile technology can be a challenge for the teachers and the school. Little research has been done on how teachers perceive using mobile technology as part of enhancing their teaching and learning.

The main aim of this study was to investigate whether private school teachers found it beneficial to use mobile technology as part of their teaching. Additionally, some teachers may have found it difficult to adapt to using mobile technology but, due to certain school policies, they are forced to integrate it in their planning. Government schools and other schools that have not yet integrated mobile technology in their schools can find this study beneficial, as private school teachers will be able to point out the advantages and disadvantages of integrating mobile technology in their teaching. These other schools will be able to learn from the findings of this study as to how they can adapt better to using mobile technology.

1.3.2 Problem statement

There are some factors that led to this investigation as to why the adoption of mobile technology in private schools has become such a big influence on teaching and learning in schools. Each private school has its own funding and its own standards, with which every learner and parent must comply. With the introduction of e-learning in several schools, it forced other schools to implement it as well. However, private schools struggle to adapt to the use of mobile technology and do not successfully use this tool in their learning. This is a barrier in learning as learners cannot experience proper digital learning and use the tools that they are comfortable with.

Teachers are not equipped with the necessary skills to adapt to mobile technology in their classrooms. Schools do not invest in training teachers to adapt to mobile technology. If teachers can creatively incorporate mobile technology into their lessons, it will successfully improve the way learners understand information in their subject fields. It will also boost the learners' creative thinking and further improve their marks.

1.3.3 Purpose of the research

The purpose of the study is to investigate how teachers adapt to mobile technology in private schools and how private schools can use mobile technology successfully in their classrooms. Furthermore, the purpose of this study is to:

- Investigate whether learners are permitted to use mobile technology,
- Investigate the extent in which learners are permitted to use mobile technology, and to
- Explore the different technology programs that the schools use.

The value of this research is to use the technology acceptance model for evaluating the data collected. To reach these objectives, the researcher set out to:

- Evaluate how mobile technology is being used in private school classrooms,
- Determine the difficulty or ease of use that teachers experience when using technology,
- Determine the usefulness of the technology for the teachers, and
- Determine the teachers' attitudes towards mobile technology in their classes.

1.3.4 Research questions

Primary research question

How do teachers in private schools adapt to the use of mobile technology in their teaching?

Secondary research questions

1. How do teachers use mobile technology in their classrooms?
2. What challenges do teachers face when using mobile technology in the classroom?
3. What is the perceived usefulness and ease of use when using mobile technology?
4. What are the teachers' attitudes towards mobile technology?

1.4 CONCLUSION

This chapter discussed the basis and aspects of this research, such as the background information of the study. The focus of the study, including the problem statement, purpose and the justification of this study, was discussed. Furthermore, the research questions that steered the study were outlined. In the next chapter, the literature review about mobile technology will be presented, which will include the theoretical framework of this study.

CHAPTER 2: LITERATURE STUDY AND THEORETICAL FRAMEWORK

2.1 INTRODUCTION

This chapter comprises the literature review, discussing several topics that are related to this study. It focuses on mobile technology in education, the perceptions of teachers about using and integrating mobile technology in the classroom and the theoretical framework, which is the technology acceptance model (TAM). Furthermore, mobile learning and electronic learning are discussed, as well as the benefits and challenges of mobile learning. The technological pedagogical content knowledge (TPACK) model is also discussed, with each of its components explained further. One of the problems found in a variety of studies is the lack of technological skills, which influences teachers in using technology. Teachers know the content when it comes to their specific subjects; however, when using technology in the classroom as a tool, teachers often learn with the learners and ignore the secondary skill of integrating technology (Gorder, 2008).

2.2 MOBILE TECHNOLOGY

Mobile technology is a popular tool that has been introduced into the educational context in many countries (Sung, Chang, & Liu, 2016). Mobile device tools, such as tablets and smartphones, have become popular to use in the classroom (Domingo & Garganté, 2016). Smartphones are a combination of digital media players, audio recorder, camera, computer and mobile phone, whereas a tablet shares the same features as a smartphone and a laptop computer. They are a cheaper substitute in comparison with other traditional devices such as personal computers (PCs) and laptop computers (Mehdipour & Zerehkafi, 2013).

Their affordability and easy functionality have led to many people purchasing these devices and using them in their everyday lives (Pegrum, Oakley, & Faulkner, 2013). Although using these devices in the classroom may be seen as a disruption, there are many tools and applications on the device that can be used to expand the tools for

learning (Pegrum et al., 2013). Furthermore, mobile devices can offer access to learning wherever you are, and positively influence student learning (O'Bannon & Thomas, 2014). Mobile technology can be seen as the most powerful tool of communication, despite having a few limitations (Chachil, Engkamat, Sarkawi, & Shuib, 2015). By using this device, learners have control over their learning process and can progress at their own pace, depending on their cognitive process (Chachil et al., 2015).

2.3 M-LEARNING AND E-LEARNING

2.3.1 M-learning

Mobile learning has been the fastest growing area with regard to information communication technology (ICT) in education (Pegrum et al., 2013). It has the potential of transforming education if it is implemented and designed in a way that is relevant to cultural and social contexts (Keengwe & Bhargava, 2014). Mobile learning can be defined as an educational provision that uses mobile devices such as personal digital assistants (PDAs) and tablet PCs, smartphones and mobile phones (Keengwe & Bhargava, 2014). Mobile learning can also be defined as using technologies and handheld devices to deliver certain educational activities in the classroom (Traxler, 2005). A variety of studies have shown that countries such as the USA, UK, Germany, France and Japan use and have more mobile phones that have advanced features than normal desktop computers (Keengwe & Bhargava, 2014).

There has not been a lot of research done on mobile learning when it comes to teacher education, which leads to teachers not being informed about the value of mobile technology and how to integrate it successfully into their teaching and learning (Baran, 2014). It is important to note that mobile technology integration is not a ‘one size fits all’ situation in which teachers possess the same skills as competent mobile technology users (Gorder, 2008).

2.3.2 Benefits and challenges of mobile learning

There are many benefits that mobile technology has when it is used in a teaching and learning environment. Many teachers worldwide have been using mobile technology to enhance their learning by experimenting with it and exploring it in different ways (Pegrum et al., 2013). Therefore, the use of mobile technology in teaching and learning has the following benefits, according to Liu, Wang, Liang, Chan, Ko and Yang (2003):

- Reducing time in tedious work,
- Students are engaged in the learning activities,
- Teachers can monitor the progress of the learner and their learning status,
- It enables group cooperative learning, and
- The application of technology-supported activities.

Furthermore, Pegrum et al. (2013) conclude that using mobile technology is motivating and engaging for learners. It is easier to be accessed by learners when they demand information, irrespective of their time and various environments (Korucu & Alkan, 2011).

Lawrence, O'Reilly and McKee (2013) explain that the development of methods to use mobile technology in the classroom has provided schools and school leaders with a variety of opportunities and challenges. Mobile technology has become an important part in the world of ICT education. Furthermore, using mobile technology has allowed teachers and learners an opportunity to access a variety of resources and information, which further supports the learning styles of learners (Lawrence et al., 2013). Learners are also able to communicate with teachers and will have a better understanding of the work that is given. Additionally, the use of mobile technology in the classroom allows teachers to adapt the educational curriculum for the learner (West, 2015).

One of the main advantages of using mobile technology is that it is portable and easy to carry around. These devices are affordable and have become good resources to

use in education (Kim, Hagashi, Carillo, Gonzales, Makany, Lee, & Gáarate, 2011). Learners are able to demonstrate their knowledge and understanding of the curriculum by documenting their work, editing and creating content (Lawrence et al., 2013).

According to Telkom (2015), there are many advantages for learners and teachers when using mobile technology in the classroom. Using mobile technology benefits them by

- Increasing their motivation for learning,
- Participating actively in class,
- Improving their skills, knowledge and creativity, and
- Increasing their responsibility and self-esteem.

However, there are some challenges regarding mobile learning that affect teaching and learning in most schools. The adaptation to mobile technology can be unsuccessful as these challenges influence its success in the classroom. With no solution to some of these challenges, they have an impact on the use of mobile technology in the classroom and school. Furthermore, these challenges discourage many teachers in successfully using mobile technology in the classroom. Mobile technology has some of the following challenges, according to Mehdipour and Zerehkafi (2013):

- Connectivity and the battery life of devices
- Common changes in the device models
- Access to private and personal information
- It can disrupt the learners' academic and personal lives
- The risk of distracting the learning process.

There are many barriers that teachers feel influence the use of mobile technology in the classroom. Mobile phones can cause a lot of disruption in the classroom and may negatively affect student performance (O'Bannon & Thomas, 2014). Another concern

that teachers had is the increase in cheating and cyberbullying when using mobile phones. O'Bannon and Thomas (2014) found that teachers had a fear of change and a lack of skills training when using mobile technology in the classroom. The influence of these barriers leads to many teachers lacking or not developing the necessary knowledge and pedagogy when integrating technology in the classroom.

Therefore, it is important that schools find solutions to these challenges, which will ensure that teaching and learning of mobile technology can be successful. These challenges need to be addressed as they influence the successful adaptation to mobile technology in schools.

2.3.3 E-learning

Computer technologies have developed rapidly over the years with the 21st century now being called the 'information age' (Korucu & Alkan, 2011). The progression of informatics technology used in education has rapidly grown over the years, which has shifted the focus of traditional education methods to the importance of technological education needs (Korucu & Alkan, 2011). With this shift, the progression of electronic learning (e-learning) became a popular notion (Korucu & Alkan, 2011). E-learning can be defined as using information and communication technologies that will help the user to access online learning or teaching resources (Arkorful & Abaidoo, 2015). In a similar definition, it is described as learning that is empowered electronically (Arkorful & Abaidoo, 2015).

E-learning incorporates many learning activities that are done through the Internet and part of those activities is mobile learning (Mehdipour & Zerehkafi, 2013).There are many perspectives in which e-learning is applied, such as online or distance learning, distributed learning and hybrid learning (Arkorful & Abaidoo, 2015). Mehdipour and Zerehkafi (2013) state that e-learning can either be real-time or self-paced, which is presented in a structured and formal way. E-learning has inevitably transformed a variety of educational forms and learning in the 21st century (Garrison, 2011). It is important that e-learning is not ignored by those who want to enhance teaching and learning (Garrison, 2011).

The main, essential feature of e-learning is blending diversity and cohesiveness in a way that is dynamic and challenges the intellectual learning ecology (Garrison, 2011). Garrison (2011) further states that e-leaning can enhance practices such as teaching. However, for e-learning to have significance in education, it must prove that it is a better medium to use to conveniently access certain content on the Internet.

2.3.4 E-learning trends in South Africa

Introducing mobile technology in the classroom has not only benefitted learners but has become beneficial to teachers as well. Using technology in the classroom has become a vital tool for learning and has provided many administrative tools that are used to modernise the educational institution (Telkom, 2015).

There are four e-leaning trends that have influenced mobile technology in South Africa. There are some schools in South Africa where learners can bring their own mobile technology devices, which replace expensive textbooks as part of the new curriculum materials (Vodacom, 2016). Secondly, there are a variety of e-learning examples that Vodacom has introduced to facilitate the progress of e-learning in South Africa. The Vodacom e-learning programs are available in both private and public schools (Vodacom, 2016). Vodacom Digital Classroom is a portal that learners and teachers can use when browsing for materials, without being charged for the data usage (Vodacom, 2016). Thirdly, the Thutong Portal has been introduced by the Department of Education, which enables teachers and learners to have access to the curriculum and resource materials (Vodacom, 2016). One of the main benefits of using mobile technology in South Africa, according to Vodacom (2016), is programmes such as iSchoolAfrica that has provided many under-resourced schools with access to e-textbooks for both learners and teachers.

Many businesses in South Africa have come together to ensure that more than one million poor South African learners have access to a fully resourced tablet in their school (Sesinye, 2019). Closed-loop Learner Network (CLN) has already ensured that more than 1 000 pupils have received these Omang tablets in the Free State (Sesinye, 2019). These tablets will be available to no-fee schools in South Africa and will be

equipped with CAPS (Curriculum and Assessment Policy Statements) approved textbooks from Grade 10 to Grade 12 (Sesinye, 2019). Sesinye (2019) further adds that the mobile network company MTN will provide free connectivity while CLN will ensure that learners will receive these devices, which will be equipped with textbooks, tutorials and online resources.

2.4 MOBILE TECHNOLOGY ADAPTATION AND INTEGRATION IN SCHOOLS

2.4.1 Teachers' perceptions about the use of mobile technology

When using mobile technology in the classroom, one has to consider the teachers' perceptions about the use of mobile technology in learning and how it influences their beliefs (Domingo & Garganté, 2016). These perceptions also have an impact on their teaching practices and whether using this mobile device is beneficial towards teaching and learning. A study conducted in Kentucky, USA, on teachers' perceptions of the use of mobile phones' features in the classroom showed that teachers did not support the use of mobile phones in the classroom (O'Bannon & Thomas, 2014). Furthermore, teachers have mentioned access to the Internet, the calendar, educational apps and the use of the calculator as the most beneficial uses of the mobile phone (O'Bannon & Thomas, 2014). Their study did not show how these teachers' perceptions influenced the adoption of mobile technology in the classroom or whether using mobile technology is beneficial for teaching and learning.

Another study that was conducted in the Turkish Republic of Northern Cyprus showed that the teachers' perceptions of using mobile technology were positive when it came to teachers adjusting to mobile technology and concerning the goals of these teachers' learning activities (Ozdamli & Uzunboylu, 2015). The study concluded that teachers and learners were willing to use technology; however, their levels of competence in using mobile technology were not sufficient (Ozdamli & Uzunboylu, 2015).

2.4.2 Technology integration and acceptance in schools

Educational technology integration can be defined as using an electronic tool that is intended to accomplish a learning outcome (Davies & West, 2014). Davies and West (2014) furthermore contend that using a technological device may help learners accomplish their learning goals. The most important factor for effective technology integration is the competence and ability of teachers to create instructional technology activities that will meet their learners' needs (Gorder, 2008). Additionally, technology integration involves teachers using the technology as a tool to improve learning in the classroom (Gorder, 2008).

A study that was conducted on the adoption of mobile handheld technologies in independent schools in Australia, found that iPads were the most popular device used and that it enhanced learning and motivation in the classroom (Pegrum et al., 2013). Another study in the USA showed that, although the iPad was used in the classroom as a new learning tool, teachers did not have practical guidance or practices that were readily available (Keengwe, 2013). A study in Malaysia found that there was a strong relationship between the teachers' awareness of and readiness for mobile learning and as a result teachers were motivated to use technology in their teaching (Ismail, Bokhare, Azizan, & Azman, 2013).

2.4.3 Adoption of mobile technology in education

Mobile technology has become a vital tool in the 21st century. This tool is used in our everyday lives and has been adopted in many private schools for teaching and learning. Mobile technology plays a major role in using m-learning in education. Mobile technology is considered a potential solution to the problem of the shortage of computers, in order to access online learning materials (Mayisela, 2013). The advantage of mobile technology is that it allows communication between learner and teacher in a blended learning course. Using mobile technology in a classroom is therefore important in our society as it has become part of our daily lives and we use it every day.

It is important that technology is adaptable in schools, which is one of the key requirements that schools must take note of. This has become a problematic issue in some schools as they have failed to successfully adapt to mobile technology (Ally & Samaka, 2013). One of the main reasons for this is that leaners are not being motivated enough in terms of using their skills and knowledge to their full potential in the learning context. This has resulted in learners failing to understand the work given, which leads to poor performance in their subject.

Mobile technology has become a tool that is used extensively in many classrooms in the 21st century. It has been found to facilitate autonomous learning where learners are able to control their own learning and establish their own learning goals (Domingo & Garganté, 2016). The integration of technology in the classroom allows for collaborative learning where learners can interact with their peers and receive immediate feedback (Domingo & Garganté, 2016). Furthermore, many primary schools use mobile technology to reinforce their learners' performance (Domingo & Garganté, 2016). However, Keengwe and Bhargava (2014) argue that using mobile technology in education can lead to unintentional consequences such as learners becoming too dependent on technology and expecting it to solve their learning problems.

Many countries around the world are not using mobile technology effectively in the classroom. This is due to teachers' lack of ICT skills and motivation when using mobile technology devices in their teaching (Ally & Samaka, 2013). This has become a factor in mobile education as it plays a significant role in the adaptation to mobile technology and how some teachers struggle to use these devices for teaching and learning. According to Ally and Samaka (2013), teachers should use Open Educational Resources that are in line with their education system. Teachers will require training about these Open Educational Resources in order to successfully integrate them into their teaching. A study in Spain found that using mobile technology applications had a significant impact on learning (Domingo & Garganté, 2016). These applications range from science and art applications that allow learners to explore places they have never been to. One of the main learning impacts of mobile technology is that it provides new

ways of learning and adapting the curriculum (Domingo & Garganté, 2016). Domingo and Garganté (2016) state that these applications are a set of content learning tools that teachers can use as part of the content that is being learned. A study found that using mobile devices increased the perceptions of learning and engagement in the classroom and it allowed teachers to use these mobile technology applications and classroom response systems to help learners respond to instructor-based questions (Heflin, Shewmaker, & Nguyen, 2017).

2.4.4 TPACK

Integrating technology in the classroom can be successful if enough planning has been done using TPACK. The technology, pedagogy and content knowledge framework is used when teachers integrate technology in their teaching (Koehler & Mishra, 2009). This model builds on the first construction of a pedagogical, content and knowledge (PCK) model by Lee Shulman (Archambault & Barnett, 2010). It was later refined by Koehler and Mishra (2009) who developed the TPACK framework. The three important forms of knowledge that must be present in each lesson are technological knowledge, pedagogical knowledge and content knowledge (Dong, Chai, Guo-Yuan, Koh, & Chin-Chung, 2015). Figure 1 shows the TPACK framework that has all the knowledge components. These knowledge components need to be integrated in a lesson that uses technology.

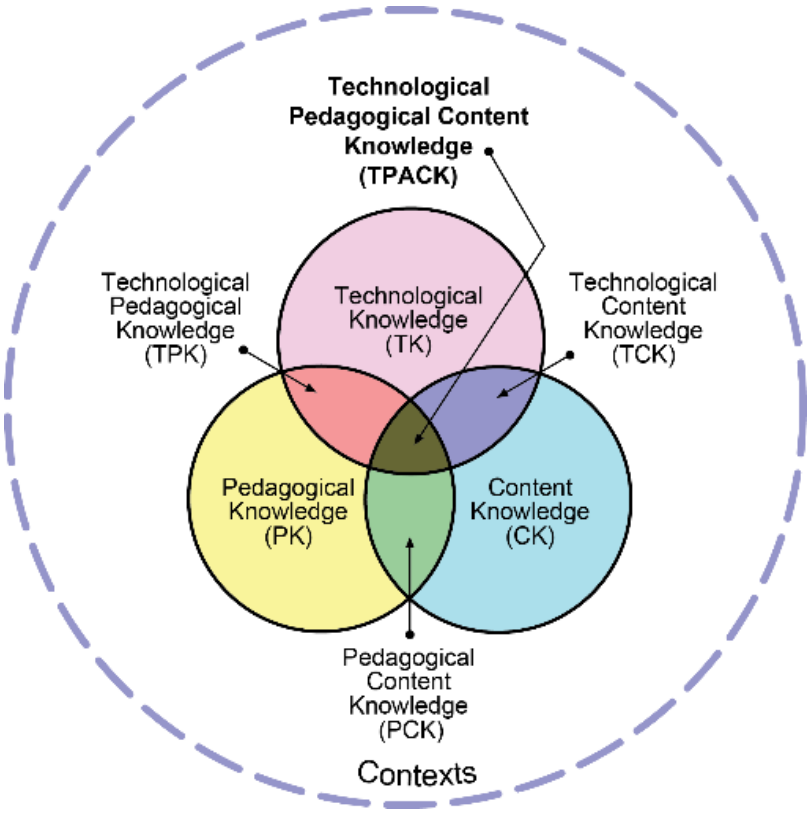

Figure 1: The TPACK framework with its components

(Source: Koehler & Mishra, 2009)

When using technology in lessons, teachers need to use this framework to successfully integrate technology in their teaching. Each component in the framework is vital when planning to integrate technology in the lesson. It will improve the successful adoption of technology in the classroom and indicate whether it was successful in reaching the lesson's goals. Furthermore, it will show what needs to be improved when integrating technology in the lesson. Research has shown that there are teachers who face challenges in preparing to use technology in their lessons. One of the main challenges that teachers face is their lack of skills and knowledge in using technology (Angeli, Valanides, Mavroudi, Christodoulou, & Georgiou, 2015). These challenges are caused by the emphasis on technical skills of many educational courses and the little time spent on learning how technology interacts with the subject and pedagogy (Angeli et al., 2015). Using the TPACK framework enables the teacher to integrate technology successfully by planning a variety of activities to reach the

goals of the lesson. It is therefore important that teachers are equipped with the necessary skills and knowledge to successfully integrate technology in their lessons by using the TPACK framework and to see how well they adapt to using technology. Teachers should use the TPACK model in such a way that it will guide the development of the teacher and the curriculum (Koehler & Mishra, 2009). Teachers' planning should be organised and be in line with the content learning goals of the curriculum (Harris, Hofer, Blanchard, Grandgenett, Schmidt, Van Olphen, & Young, 2010).

2.5 THEORETICAL FRAMEWORK

The model used as the theoretical framework of this study is the technology acceptance model (TAM). The technology acceptance model was introduced by Davis in 1989. This model was designed to see how technology is being used and accepted (Park, 2009). Davis proposed this model to predict and explain the behavioural intention to use technology and how external variables influence this behaviour (Park, 2009). Park (2009) further elaborates that this model explains the reasons why a user of technology would accept or reject information technology, based on beliefs, attitudes and intention to use the technology. Figure 2 is an illustration of the original TAM that was first submitted by Davis in 1989.

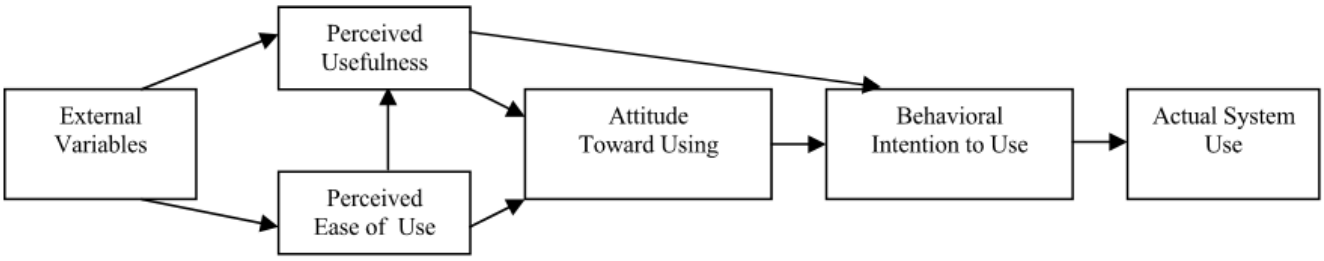

Figure 2: Original technology acceptance model

(Source: Chuttur, 2009)

The technology acceptance model is a baseline that allows the researcher to understand how the external variables influence the users' attitudes, beliefs and their intention to use information technology (Park, 2009). The two intellectual beliefs suggested by TAM are the perceived ease of use (PEU) and the perceived usefulness (PU) (Park, 2009). The perceived usefulness, according to Park (2009), is that degree in which a user of technology believes that using this tool will enhance his/her work performance, whereas the perceived ease of use is how the user uses technology. Furthermore, the depiction of TAM is seen as how the use of a technological system is directly or indirectly influenced by the user's attitude, behavioural intentions, perceived ease of use and perceived usefulness of the system. The perceived usefulness and perceived ease of use of mobile technology were the focus of this study and allowed an insight into the teachers' and schools' attitudes when using mobile technology in the classroom.

2.6 CONCLUSION

This chapter dealt with a variety of literature that focused on mobile technology adaptation as well as the theoretical framework used for this study. It began by discussing mobile technology as a whole and what it comprises. The chapter then went on to discuss terms such as mobile learning and electronic learning, which are used in teaching and learning. A study of teachers' perceptions of using mobile technology was discussed and how some schools have integrated mobile technology in their classrooms. One of the key challenges that some of these schools faced was the lack of technological skills of their teachers and not using the TPACK for effective planning. The next chapter will discuss the research methodology that was used, such as the research approach, research paradigm, research strategy, population and sampling, data collection and analysis and, lastly, ethical considerations.

CHAPTER 3: METHODOLOGY

3.1 INTRODUCTION

This chapter focuses on the research methodology that was used for this study. In the first section of the chapter, the philosophical foundations for this study are discussed and the paradigm that was used. It moves on to discuss the research approach that was used in this study, which led to the research strategy, relating to the research approach used. Furthermore, the population and the sampling method are discussed, followed by the data collection and analysis, which are discussed in the final section of the chapter.

3.2 RESEARCH PHILOSOPHY

When conducting research, it is important to identify a research philosophy that will aid in understanding the phenomena that is being researched (Sefotho, 2015). Ontology can be defined as the study of being and its assumptions of what reality is (Scotland, 2012). In a simpler definition, it is the study of being in which a researcher asks certain questions about the reality of the study (Sefotho, 2015). It is mostly concerned with the realities of the world. The main focus of this study was to investigate teachers' adaptation to using mobile technology in private schools and their behaviours associated with the adaptation. The multiple realities explored in this study allowed for assumptions to be made on mobile adaptation in private schools.

Epistemology can be defined as how one views the knowledge of a study (Mack, 2010). Furthermore, Mack (2010) describes epistemology as a theory of knowledge that is rooted in the theoretical perspective of a study. These perspectives lead to having a paradigm that can be used for the study. Epistemology is the assumptions of the creation of knowledge and communication (Scotland, 2012).

One of the main aims of the epistemological paradigm is to provide transparency in the interpretation of the results. Sefotho (2015) further elaborates that epistemology is concerned with the many forms of knowledge and its nature. The philosophy that suits

this research methodology is the interpretivist paradigm. By using this paradigm for the study, it allowed me, as the researcher, to gain more knowledge and understanding as to how teachers adapt to using mobile technology in the classroom. A variety of teachers were able to give their own views and perceptions with regard to mobile technology in the classroom. The 'antipositivist' paradigm was developed as part of the interpretivist development, which was seen as a reaction to positivism (Maree, 2016).

The interpretivist paradigm emphasises the construction of meaning from the individual. Constructivism deals with what we know and how we know it (Kratochwil, 2017). It is a theory that deals with observation and understanding of how people learn (Bada, 2015). Bada (2015) further adds that, through experience and reflection, people construct their own meaning and understanding. The purpose of this study was to investigate teachers' adaptation to mobile technology in the classroom, which was used as a lens as to how they perceive using mobile technology. This research methodology is described as perceiving the world as constructed and interpreted by the experiences of people in their social settings (Tuli, 2011).

According to Maree (2016), the interpretivist perspective are based on the following norms:

- The life of a human can only be understood from inside.
- Human product is the characteristics of a social life.
- The mind of a human is seen as the source of meaning.
- The behaviours of humans are affected by the social world of knowledge.

One focus of the interpretivist paradigm is the emic approach which is also known as the inside approach; it is a subjective approach that involves interaction (Maree, 2016).

3.3 RESEARCH APPROACH

A qualitative research approach was used for this investigation. A qualitative research approach was the best to use for this investigation as it aims at finding out certain things about the behaviours of people (Hancock, Ockleford, & Windridge, 1998). The

nature of this approach is to understand the interpretation of people's experiences and finding meaning in these experiences (Maree, 2012). One of the characteristics of a qualitative approach, according to Maree (2012), is that it focuses on meaning, which is interpretive. Furthermore, the investigation focused on a deeper description of the phenomenon, namely the acceptance of mobile technology in private schools.

3.4 RESEARCH STRATEGY

When selecting a research design, it was significant to choose a design that is based on the intent for the research, which was interpretive. It is imperative that the data captured the learning and the adaptation to mobile technology use in the school (Hamilton & Corbett-Whittier, 2013). Case study research, according to Hamilton and Corbett-Whittier (2013), can be defined as an approach that captures data which provide a deeper meaning into what is being researched. Furthermore, case study research, according to Hamilton and Corbett-Whittier (2013), is characterised by:

- a bounding unit such as a school,
- a location that is either personal or professional,
- a focus on collecting rich data,
- the interaction, communication and practices within the real-world context,
- the use of a variety of data collection tools that provide different perspectives.

An explorative case study was the research strategy in this investigation. This type of case study is categorised by collecting data, which is followed by looking at the different patterns that the data reveal (Hamilton & Corbett-Whittier, 2013). When doing research on education, case studies are used to explore an experience that has been bounded by a certain system (Maree, 2012). Case study research can be defined as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context" (Maree, 2016, p.107). One of the defining characteristics of a case study is that it delivers a very detailed exploration of the phenomenon that is being researched over a period of time. It also uses a variety of information sources to explore the phenomenon in its context (Maree, 2012). The main advantage of a case study is the

close relationship that the participants have in the research and how they are able to share their stories and experiences (Maree, 2016).

Using a case study for this research was appropriate as it provided an exploration of the use of mobile technology in the classroom. Exploratory case studies are characterised by collecting data and later looking for patterns in the data collected (Hamilton & Corbett-Whittier, 2013). This was done by interviewing the participants, namely the teachers, on how mobile technology is used in the classroom. This research took place in private schools that use mobile technology.

It was important to have a close collaboration between the teachers and researcher as it provided a better understanding of the acceptance of mobile technology in the classroom.

The research methodology used provided a lens into the behaviours of teachers towards mobile technology adoption. It provided an opportunity for the researcher to study the phenomena in their complex contexts (Maree, 2016) which led to a better understanding of the adaptation to mobile technology use. It furthermore provided explanations as to why teachers adapt to using mobile technology in the classroom and their opinions regarding mobile technology.

3.5 POPULATION AND SAMPLING

The schools that were selected were private schools situated in Centurion. These were schools that use mobile technology in their teaching and learning. The participants who were selected were teachers at these schools. The teachers who were selected were two to three high school teachers in each of the three schools that formed part of the research. Selecting the sample was based on teachers who use mobile technology in their classrooms. The sample size was based on the grades that the teachers teach and their willingness to participate in the study. These participants provided feedback on how they use mobile technology in the classroom and school and it provided more information on and understanding of this topic.

3.6 DATA COLLECTION AND DOCUMENTATION

The most common types of interviews are semi-structured interviews (Doody & Noonan, 2013). This type of data collection was significant when answering the research questions of this study. It can be defined as the researcher asking open-ended questions which lead to curious questions so that the participant will provide additional information (Bernstein & Lysniak, 2017). One of the aims of this method is to have fixed questions that will further provide clarification about the research phenomenon (Doody & Noonan, 2013). According to Doody and Noonan (2013), semi-structured interviews have the advantage of allowing the researcher to have more complex questions that will allow the participants to give detailed responses and their own interpretation of these events. However, semi-structured interviews are time-consuming and the questions must be well prepared in advance. Furthermore, feelings may be evoked and this type of interview can be biased at times (Doody & Noonan, 2013). It is important for a researcher to be attentive to the responses of the participant in order to identify emerging lines of inquiry which are relevant to the study (Maree, 2016).

To be able to conduct interviews, questions must be well prepared in advance. Open-ended questions it allow participants to describe their own thoughts and opinions in their own words (Bernstein& Lysniak, 2017). It also allow the researcher to explore various issues that arose during the interviews (Doody & Noonan, 2013). It is important to base these questions on behaviour, knowledge, experience and the demographic details of the participants (Doody & Noonan, 2013). Furthermore, these questions must be worded purposefully in order to develop them into a conversation that will focus on the research topic (Doody & Noonan, 2013).

The responses of the participants were recorded digitally and in writing. Permission was asked beforehand to digitally record the participants' responses. The advantage of digitally recording the participants' responses was that it allowed me, as the researcher, to transcribe responses from participants accurately (Opdenakker, 2006). Furthermore, notes were taken during the interviews to record the participants'

responses, as well as my own reflective notes made throughout the interviews. Figure 3 provides an example of how I transcribed the interview questions as well as my own reflective notes:

Own reflective notes and observations	Transcript
	Researcher: (Question) Participant: (Response)

Figure 3: Example of the interview transcript

(Source: Maree, 2016)

The semi-structured interviews allowed a deeper understanding of how teachers adapt to and use mobile technology in the school and classroom. Analysing the participants' views and opinions towards the research questions was done by conducting the interviews this way. It furthermore provided an opportunity to explore new paths of the research that had not yet been explored.

3.7 DATA ANALYSIS

The data that were collected in the interviews were interpreted and analysed based on the research questions. This data provided insight into understanding the research questions and could possibly answer these questions. It provided evidence of the aim of this study and supported the rationale of finding solutions to use mobile technology sufficiently in the classroom. During the data analysis stage, it was vital to recall the study field notes in order to verify certain conclusions and additionally collect more data from the participants (Maree, 2016). The three elements that were vital in this stage were noticing, collecting and reflecting. The reflection stage revealed some data gaps in the research which led the researcher in obtaining additional information in order to fill these gaps.

The data analysis strategy that was used to analyse the data is called hermeneutics. Hermeneutics can be defined as the method of interpreting certain texts (Schmidt, 2016). It provides a philosophical approach when it comes to understanding human behaviour, which links with the interpretivist research philosophy (Maree, 2016). Understanding the text in full and interpreting it is vital when analysing the data as it will be guided by certain explanations (Maree, 2016). Atlas.ti is the qualitative data analysis software package that was used to analyse the collected data. This type of software helped in coding the data and retrieved certain information that helped in interpreting the data. This data visualised the importance of certain information and whether it will aid in understanding the study. Furthermore, the software helped to see whether there are similarities or differences in the data. Keeping a reflective journal during the data collection and analysis stages prevented me from bringing my personal views to the research.

3.8 ETHICAL CONSIDERATIONS

3.8.1 Informed consent

An agreement between the volunteering participant and the researcher was recorded in written format. The participants were provided with an informed consent letter in which they confirmed that they were willing to participate in the study. The principals of each private school also received these letters to ask for permission to conduct the research in their schools.

3.8.2 Confidentiality and anonymity

It is important to protect the confidentiality and anonymity of the participants when conducting research. The participants must be comfortable enough to express their views and opinions without being exposed. Confidentiality can be defined as speaking and writing with confidence that the information provided will not be disclosed, whereas anonymity is defined as an unknown name or authorship (Wiles, Crow, Heath, & Charles, 2008). In order to provide protection to participants and ensure confidentiality and anonymity in gathering information, pseudonyms were used to

protect the identity of the participants. All data were collected anonymously and were treated as confidential and therefore gained the trust of the participants.

3.9 ASPECTS OF TRUSTWORTHINESS AND CREDIBILITY

The key measures of qualitative research are trustworthiness and credibility (Maree, 2016). Maree (2016) states that, in order to test your trustworthiness when it comes to data analysis, as well as your findings and conclusions, there are certain procedures a researcher must keep in mind when accessing the data.

3.9.1 Credibility

Credibility in research deals with two questions: How will the results be believable to the reader and how are the findings similar to reality? (Maree, 2016). The internal validity of the research needs to be measured to see whether the study has measured or tested what it has intended (Shenton, 2004). Researchers can use some of the following provisions that will assist them to ensure that the phenomena of the research have been recorded accurately (Shenton, 2004):

a) How the researcher adopts research methods that are found in the qualitative investigation.

b) Researchers should make sure they are familiar with the culture of those who will participate in the research.

c) By using random sampling to select participants who will serve as the informants.

d) By using peer review to evaluate the research project.

e) By using triangulation, such as different research methods.

The following strategies were used to ensure that there is credibility in the study:

- *Reflection on own perspectives:* A reflection journal provided my own perspectives throughout the data collection process. Details of decisions taken

were also documented. Personal bias was accounted for if it influenced the findings.

- *Research phenomena representation:* By using audio recordings of the semi-structured interviews, it allowed me to revisit the data to identify whether there are any emerging themes and whether the participants have stayed true in answering questions about mobile technology adaptation. Participants of the study were also invited to review the study and make certain comments about the study.

- *Thorough record-keeping:* Record-keeping of interviews and a reflective journal provided transparency in the decision-making process and ensured that the data stayed consistent throughout the study.

Credibility of the research findings required that the participants were able to see how their perspectives have been reflected in the research (Clissett, 2008). Clissett (2008) adds that frequent engagement with participants is one of the ways in which credibility in the research can be enhanced.

3.9.2 Transferability

Transferability can be referred to as the extent to which the results of the study can be transposed to other groups or settings (Graneheim & Lundman, 2004). Such results can be transferred to other contexts, including research with other respondents (Anney, 2014). In order to facilitate transferability, Anney (2014) states that the researcher must provide a detailed description of the sample and the method of enquiry, which will assist in facilitating transferability. This, according to Maree (2016), is when the researcher provides the reader with a purposeful account of the participants, context and the research design, which will enable readers to make their own decisions with regard to transferability.

One of the aims of transferability is to invite the readers of the research to make their own connections regarding their personal experiences and the foundations of the study (Maree, 2016). There are challenges concerning transferability. Studies that are

done on a small scale may influence the findings as the issues in the study are limited (Clissett, 2008). It is therefore important that readers of the study must make decisions about the similarity of the findings of the study with regard to the situation in which they are applying the findings (Clissett, 2008). In order to increase transferability in research, Maree (2016) states that the researcher must focus on the representation of the participants in terms of the focus of the study and the contexts to which the findings of the study apply.

One of the strategies used in this research to ensure transferability was to describe in detail the setting of the interviews, the participants in the study and other aspects of data collection that should help the reader understand the research setting. For example, when and where the interviews took place and how the interviews were conducted. Describing the daily lives of the participants in their social and cultural environments will allow readers to make their own judgements about the data. Furthermore, it was important for the participants to express their social and cultural contexts, which helped with these judgements.

3.9.3 Dependability

Achieving dependability in qualitative research can be difficult. Dependability relies on the assumption that there is something that is ‘out there’ that is unchanging and tangible (Clissett, 2008). Researchers evaluate the findings, interpretations and the recommendations of the research to make sure that the data that they received from the informants are supported (Anney, 2014). Maree (2016) states that dependability can be established through the implementation of the research design, the reflective evaluation of the project and the details of data collection.

One of the ways in which a researcher can ensure dependability in the study is to keep a reflective journal (Maree, 2016). By doing so, Maree (2016) mentions that the researcher will be able to help other readers to follow the reasoning behind the research process. It is valuable to document the analysis process as it will allow the reader to see the processes and decisions made and how the analysis of the data came to be (Maree, 2016). Another method that can be used to achieve dependability

is through peer examination (Anney, 2014). This process involves the researcher discussing the research process and findings with other neutral colleagues, such as doctoral students, who have experience of or are doing qualitative research (Anney, 2014). During the research, I kept a reflective journal that documented how the data were collected and how it was analysed to reach certain findings and conclusions. This reflective journal also contains my thoughts and opinions about certain areas in the research.

3.9.4 Confirmability

Confirmability is the degree in which the findings of the study are shaped by the participants. In other words, whether they are neutral and not influenced by the researcher's bias, motivation or interest (Maree, 2016). In order to reduce bias, researchers must admit to their own predispositions (Maree, 2016). One of the concerns of confirmability is to ensure that the interpretations of data findings are not from the researcher's imagination, but rather from the data collected (Anney, 2014). It is the extent in which the findings of the study and the conclusions are related to the data that have been collected (Clissett, 2008).

One of the ways in which confirmability in qualitative research can be achieved is to clarify links between the data that have been collected and the results (Clissett, 2008). Triangulation plays a huge role in ensuring confirmability in research. It involves a variety of methods such as observation, individual interviews and focus groups (Shenton, 2004). Another method that Anney (2014) mentions is keeping a reflective journal. One of the primary concerns for the investigator is objectivity (Shenton, 2004). Shenton (2004) explains that the results of the findings in the study must be the experiences of the participants and not of the researcher's characteristics and preferences.

I triangulated my data by collecting lesson plans from the teachers, keeping a reflective journal and using the data collected from the interviews. These documents helped in getting a better perspective of the research topic. These documents were reported and used as reflection and for interpretation of data collected (Anney, 2014).

3.10 CONCLUSION

The chapter began with a detailed description of the research philosophy of the study. The research paradigm that was used is the constructivist paradigm. The chapter moved on to discuss the qualitative research approach that was used. This approach focused on interpreting the data collected. The design of the study, namely the explorative case study, was used to determine a variety of patterns in the data collected. This case study was done over a period of time and it explained the phenomena that were observed.

The chapter went on to discuss the population and the sample that was selected for this study. Three private schools in Centurion were selected for the research. Teachers that use mobile technology in their teaching were selected as the participants. Data collection strategies, such as semi-structured interviews, and the hermeneutics for data analysis were discussed. Ethical considerations such as informed consent and confidentiality and anonymity of the participants were discussed. Lastly, the aspects of trustworthiness (credibility, transferability, dependability and confirmability) relating to qualitative research were discussed.

Chapter 4 will present the results of the research by unpacking the data collection methods and analysing the results. I will also discuss the findings in Chapter 4 and the emerging themes that were identified when analysing the data.

CHAPTER 4: DATA ANALYSIS AND FINDINGS

4.1 INTRODUCTION

This chapter focuses on analysing the data that were collected. This analysis includes analysing the transcribed semi-structured interviews and the lesson plans. During the analysis, the emergent themes were identified when coding the data with the help of a former master's student, which allowed a neutral approach in analysing the data. This student helped by looking at the data and identifying important themes and also by providing a guideline on how to interpret the data.

As stated in the previous chapter, data were collected through semi-structured interviews that took place at three schools in Centurion. A total of eight educators were interviewed. The following objectives were used as guidance for the interviews:

1. To evaluate how mobile technology is being used in private school classrooms.
2. To determine the difficulty or ease of use that teachers face when using technology.
3. To determine the usefulness of the technology for the teachers.
4. To determine the teachers' attitudes towards mobile technology in their classes.

The objectives were reached by using the following research questions:

Primary research question

How do teachers in private schools adapt to the use of mobile technology in their teaching?

Secondary research questions

1. How do teachers use mobile technology in their classrooms?

2. What challenges do teachers face when using mobile technology in the classroom?
3. What is the perceived usefulness and ease of use when using mobile technology?
4. What are the teachers' attitudes towards mobile technology?

4.2 PROCESS OF DATA COLLECTION

Data were collected through semi-structured interviews. These interviews were face-to-face and took place at the participants' schools. Appointments were made with each of the school principals in order to obtain permission to interview teachers. Once permission was obtained, appointments were made with each participant to take part in the interview.

At the beginning of each interview, introductions were made where I outlined and explained the purpose for my research. I then gave them consent forms to sign and asked for permission to record the interview. Each participant was asked a total of 20 questions, as shown in Annexure C, and they were free to express their own thoughts and opinions. They were also required to fill in the survey at the end of the interview. If participants did not understand the questions they were allowed to say so and I explained the question in a way that would make it clear.

4.3 BACKGROUND INFORMATION OF SELECTED SCHOOLS AND PARTICIPANTS

The backgrounds of the selected schools are described briefly in order to understand the context of the selected participants. This information was gathered through the semi-structured interviews where each participant had to briefly give some background information about themselves. Table 1 summarises the participants' background information and a further brief discussion about the selected schools and participants will follow.

Table 1: Background information of participants

Participants	Age	Qualifications	Subjects taught	Years of experience	Specialised ICT training
Participant 1	43	MSc	Natural Science and Life Sciences	20	ITSI training
Participant 2	23	BEd FET	Mathematics	3	None
Participant 3	28	BEdHons	CAT, Life Sciences & Consumer Studies	5	HTML, OneNote, Synergy, ITSI, Minecraft, Snapplify, Microsoft
Participant 4	27	MA Special and Inclusive Education	English HL	5	Online technology course through UCLA
Participant 5	54	BCom Ed (BEd)	Mathematics	31	ITSI training, Google Classroom
Participant 6	53	BA HED	English	31	General Google training
Participant 7	34	BA HMS PGCE	Life Sciences	13	Google training, ITSI
Participant 8	56	HOD BK: VDO Onderwyserbestuur	Engineering Graphics and Design	22	Advanced Certificate (Computer Integrated Education)

SCHOOL A

This school is situated in a suburb of Centurion. It is a private, co-educational school and has grades from Grade 000 up to Grade 12. Mobile technology was first introduced five years ago, starting with tablets and cell phones. The participants chosen for this study included teachers whose use of mobile technology ranged from frequently to rarely. Young and older teachers were selected in order to gain a perspective on their mobile technology use. It is significant that the older teachers shared their views and opinions on mobile technology as it is a new tool to which they have had to adapt in their teaching. This school does provide training for the teachers, specifically Google training. It is significant in the study to show whether teachers find the training beneficial.

SCHOOL B

The school is situated in a newly developed area in Centurion. It is a new private school that was opened in 2019 and has state-of-the-art facilities. It is a co-educational school that has grades from Grade 000 up to Grade 12. This school was chosen to show the teachers' perspectives on mobile technology in a new school that had no prior experience in using the devices. The participants who were selected were young and middle-aged teachers. These participants were selected to see whether the teachers enjoy using mobile technology in a fairly new school and to observe their challenges in using these devices in a new environment. Training is provided in the school on how to use the ITSI portal but no other training is provided by the school.

SCHOOL C

This school is situated in a suburb of Centurion and opened six years ago, also introducing mobile technology at that time. It is an independent, co-educational school that has a primary and a high school. This school was selected to see how they have adapted to using mobile technology since opening six years ago. The participants who were selected were young and used technology in their teaching. These participants were selected through the help of the principal who identified them as frequent

technology users. Training is very limited in the school and teachers are trained to use the ITSI portal. The selected participants have done their own training and have further provided training to other teachers in the school.

4.4 EMERGING THEMES FROM THE DATA

This section provides themes that emerged when analysing the data. These themes were derived from the codes that were assigned when analysing the data. The codes allowed me to categorise the data according to the themes that were emerging during the analysis. These themes are summarised in Table 2 which shows the links between the research questions, themes and sub-themes and the theoretical framework used in this study.

Table 2: Emerging themes linked to research questions and theoretical framework

Research questions	**Themes and sub-themes**	**Theoretical framework**	**Data source**
How do teachers use mobile technology in their classrooms?	*Theme 1: Mobile technology as a LTSM* Teachers' confidence in using mobile technology. Mobile technology resources – Applications & programs. Lesson planning and teaching (Pedagogy).	Perceived usefulness. Attitude towards using. Behavioural intention to use.	Semi-structured interviews.

What challenges do teachers face when using mobile technology in the classroom?	*Theme 3: Mobile technology in the classroom* Challenges.	Perceived ease of use. Attitude towards using. External variables.	Semi-structured interviews.
What is the perceived usefulness and ease of use when using mobile technology?	*Theme 1: Mobile technology as a LTSM* Teachers' confidence in mobile technology. Lesson planning and teaching (TPACK). *Theme 2: Relevance of mobile technology in the classroom* Benefits of mobile technology (learning benefits). Learners' perceptions as viewed by teachers. *Theme 3: Mobile technology in the classroom* Teachers' perceptions. Challenges. Teachers' knowledge of mobile technology.	Perceived usefulness. Perceived ease of use. External variables.	Semi-structured interviews. Survey.

What are the teachers' attitudes towards using mobile technology?	*Theme 1: Mobile technology as a LTSM* Teachers' confidence in mobile technology. *Theme 2: Relevance of mobile technology in the classroom* Benefits of mobile technology (learning benefits). *Theme 3: Mobile technology in the classroom* Challenges.	Perceived usefulness. Perceived ease of use. Attitude towards using.	Semi-structured interviews. Survey.

4.4.1 Theme 1: Mobile technology as a LTSM

One of the emergent themes in this study was the use of mobile technology as part of the LTSM in teaching and learning. This theme discusses how mobile technology is being used as a LTSM in the classroom. It highlights how confident teachers are in using mobile technology, the different programs and applications that they use and how they incorporate mobile technology into their planning.

4.4.1.1 Teachers' confidence in using mobile technology

In order to successfully adapt to using mobile technology, teachers need to have confidence in being able to use it in their teaching. One of the findings in the study showed that teachers who have a positive attitude towards using mobile technology are able to use it daily and create interesting content for their learners. Participant 4 said that she found it easy to incorporate mobile technology into her teaching. Over

time she has found confidence and has been able to create games for her learners to help their learning process and to grasp content better.

> *"It comes naturally. When I first started teaching, I was terrified of Excel and I was terrified of technology. I didn't want to look like I was incompetent. When I went to teach overseas, I was forced to use technology as that is what they used. So, when I came back to SA, I had all of this knowledge of how to do these activities and games. It's time consuming but it is worth it."*

Another finding in the study is that if teachers are given regular training in mobile technology it boosts their confidence, as it allows them to explore a variety of ways to use the mobile technology. Participant 5 stated that it was difficult to use and incorporate mobile technology into her teaching; however, receiving training "*has made it a lot easier".* Training seems to play a vital role for teachers in gaining confidence. This was noted by Participant 2 who mentioned one of the benefits of receiving training and having the IT support staff at the school to assist teachers with their tablets. She said:

> *"When the lady showed me everything that we could do, she showed me more than one thing to do. She also showed me how I could play around on the system and find better ways to do some of the things."*

When teachers were asked how they have adapted to using mobile technology in their teaching, the majority of the teachers indicated that they have adapted well. One of the findings showed that the younger teachers were more involved in using technology and creating new content for their learners. They mentioned that they wanted learners to interact more with one another and with the teachers. One teacher mentioned that she used mobile technology in the classroom for the games that she created. These games are used to target the lower-level learners to "*help with their comprehension skills"*. A game that is popular among the teachers to use is Kahoot, which allows the learners to not only be competitive, but also grasp content in a more fun and exciting way.

> Participant 4: *"With juniors it's a little bit easier that the idea of competition is something that they strive for. So, when you make games and it is competition based then it helps a lot."*

A general use of mobile technology that many of the teachers mentioned was to use it to upload worksheets, memos, content, tests and to communicate with learners. Teachers had the following to say about how they used mobile technology in the classroom:

> Participant 3: *"They can Google information, watch videos on YouTube and play games such as Kahoot. They can use it to access Office 365. They can use it to access resources and their textbooks."*

> Participant 5: *"To access the textbook. To access extra worksheets and give notices to them* [to communicate]. *Some teachers give homework on their devices and revision work."*

Teachers of all three schools mentioned that their textbooks were electronic and that they used an application called miEbooks. One of the teachers said that she still *"prefers a hardcopy of the textbook"* as it was difficult for her to teach using the tablet as a textbook.

When asked how often mobile technology was being used in the classroom, many of the participants stated that it was used daily and has become part of teaching and learning. However, Participant 6 stated that mobile technology in her classroom was not used daily.

> *"It's difficult to say. With the lower grades it's very seldom. It's used more with seniors for research purposes for example, so it depends on the teacher's request and instruction. In English as a subject it's not used daily."*

One of the findings indicated that language teachers did not use the tablets as often as other teachers in other subjects. Subjects such as English and Life Sciences have limited use of the tablets when compared to a subject such as Engineering Graphics

and Design (EGD) where it is essential to use mobile technology. Participant 8 mentioned that learners take snapshots of drawings in class on their cell phones, which allows them to finish the drawing at home or catch up if they are absent. He further said that they use their laptops and tablets for their Computer Aided Design (CAD) drawings daily.

4.4.1.2 Mobile technology resources: Applications and programs

The most popular of the mobile devices that were used in all of the schools were tablets. These devices are essentially used to access their electronic textbooks. Figure 4 lists all the different mobile technology devices that are used in all of the schools. One of the schools introduced the new Chromebooks as part of their teaching and learning. Chromebooks uses Google Chrome as its operating software. One of the teachers noted that only learners in the lower grades use Chromebooks, whereas the higher grades use their laptops.

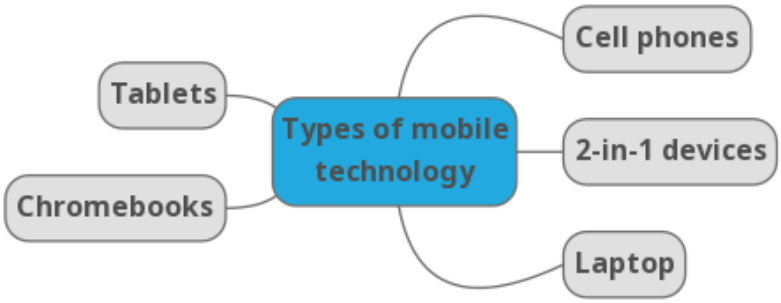

Figure 4: Types of technology that teachers use

Another popular device that is used in the classroom are cell phones. Teachers have allowed learners to use cell phones for research purposes, to play educational games and communicate with the teacher. Participant 4 further explained her use of the cell phone in her subject. She said:

> *"I also have a separate work phone. On that phone there are groups of the classes that I teach. They can submit privately to me. So, they are constantly in contact with me and they can also ask me questions about the work we did in class."*

Another teacher mentioned how he allows learners to use their cell phones in class. Participant 8 said:

> *"The cell phones are there for research and to take snapshots of drawings."*

Participant 2 and 4 mentioned how they used cell phones for educational games and how sometimes it is a struggle to use it in the classroom.

> Participant 2: *"I also learned to use a cell phone for learning purposes such as the game Kahoot. It's difficult to use that in the classroom, because it takes very long for everyone to 'join' the 'game' on Kahoot and sometimes I don't know if the learners are actually busy with Kahoot or with their own game."*

> Participant 4: *"Only when we are playing the games. When we are doing the games to connect. Most of the time it's in groups as my classroom is set that way, so it won't be all the students on their phone. It will be one group member who will be on their tablet or phone. If I have 25 students with their cell phones out it's going to be a problem and I cannot control what they are doing. Also, what they do on their phones and what they do on their tablet is linked so I can see what they are actually doing."*

It was evident that many of the teachers use a variety of software and applications in their teaching. Figure 5 shows the many different applications that teachers make use of in their teaching.

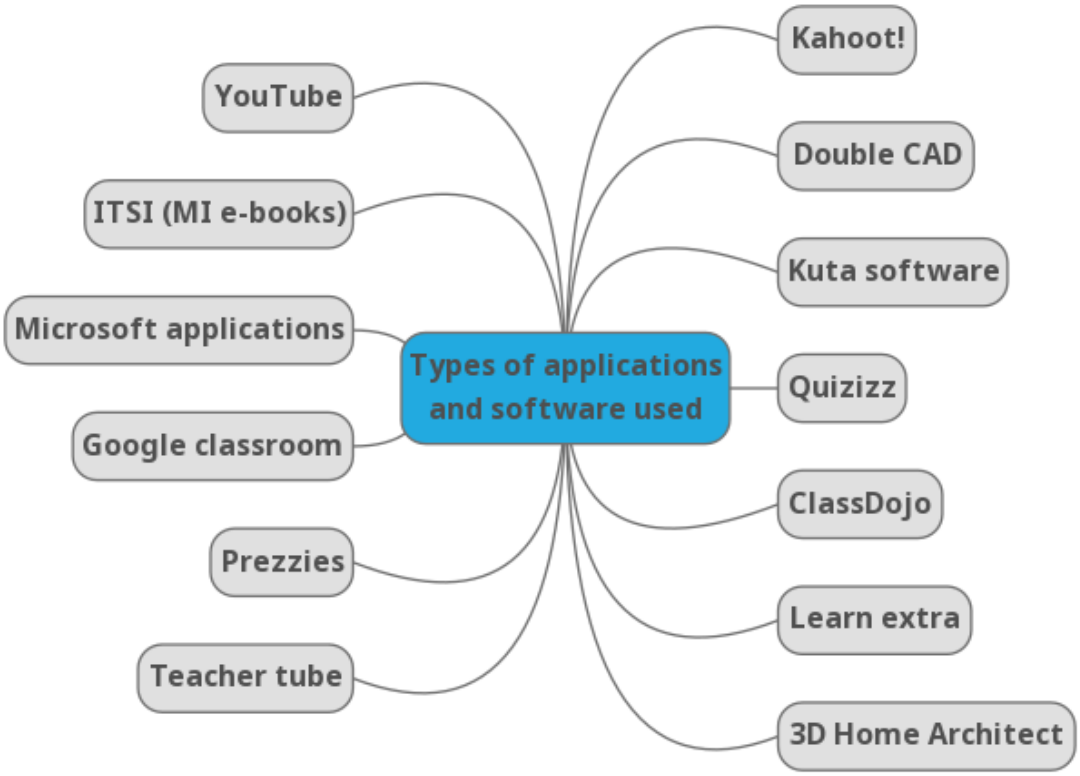

Figure 5: The different programs and applications that are used by teachers

A popular application that is used among teachers is Kahoot. Quizizz is another application that is used by teachers to quiz learners on certain concepts in their subject. Teachers described their use of these applications:

> Participant 3: *"I use it for Kahoot which is an online quiz game that they can play on their tablets. The questions are projected onto the screen through your laptop and the learners choose the answers on their tablets either ABCD."*
>
> *"Kahoot and Quizizz is used for revision and testing."*
>
> Participant 4: *"One of the games we use a lot is Kahoot – that's a general game that's been made. A code will be put up and then they would have to log onto the website using that code."*

Some of these applications complement the subject that the teachers are teaching. For a subject such as EGD, it is essential to use software such as 3D Home Architect and Double CAD, as it is a requirement. Another application that one teacher uses is ClassDojo. This is an application that is used for classroom management. Participant 4 found using this application beneficial when communicating with parents. She said about her use of the application:

> *“I use an app called ClassDojo. That allows me to make notes on the students that when the parents come for parents meeting, I can pull it up digitally and I have my notes available for them.”*

It is clear that most teachers make use of PowerPoint to create slideshows for their learners and to make them available to them. Participant 4 explained her use of PowerPoint by creating interactive games for the learners, due to having connectivity issues when playing games online:

> *"I have created a lot of PowerPoint games because a lot of the time the network goes down and we can’t connect. It is tedious for the students to connect so I prefer not to use the Internet.”*

Google Classroom is another application that is used by teachers for communication purposes and to load resources.

One of the main software products that teachers used was ITSI portal, which has the miEbooks application. This software is used for electronic textbooks and to push content for the learners. Figure 6 is a screenshot of how the ITSI portal looks on the learners’ tablets. As seen in the figure, there are numerous resources that were pushed into the learners’ tablets and the different chapters of the textbook the learners can access. Participant 2 mentioned how she uses the portal in her class.

> *“In my class I used it for multiple-choice tests. Their textbooks are also on the tablet. I upload worksheets and revision documents on their tablets continuously throughout the term.”*

Another teacher mentioned that she uses the portal *“to push content such as PDFs and videos”.*

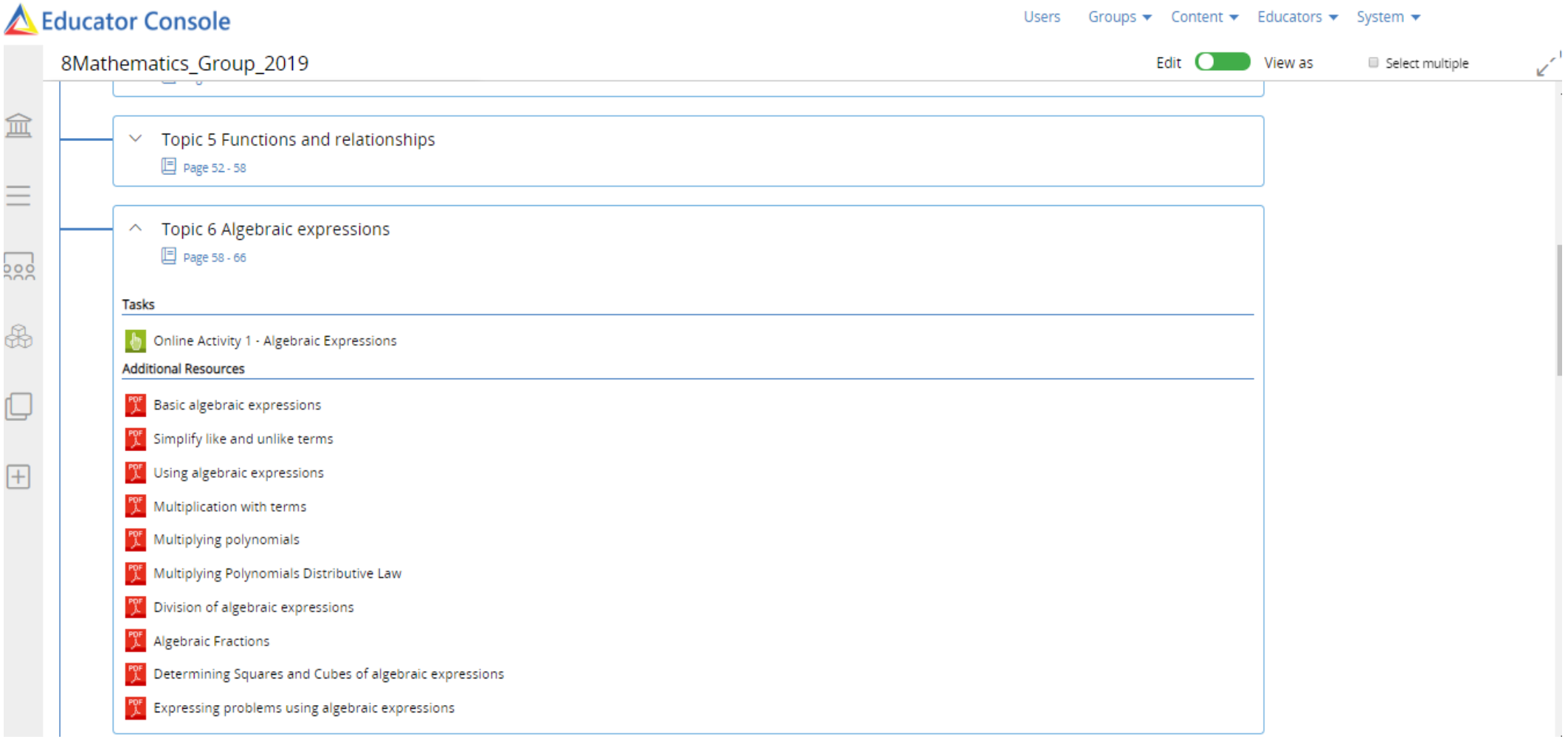

Figure 6: Screenshot of ITSI portal

4.4.1.3 Lesson planning and teaching (TPACK)

Integrating technology in lesson planning is important. How teachers use technology in their teaching shows whether they are successfully adapting to using it in the classroom. The TPACK model allows one to see whether teachers have the skills and knowledge to teach certain concepts using technology (Koehler & Mishra, 2009). It is important that teachers understand pedagogical techniques to teach content and how technology can aid in addressing problems that learners face when learning certain content and concepts (Koehler & Mishra, 2009).

It is clear that all of the teachers use technology as part of their planning. Participant 6 mentioned how she used different programs and applications in her teaching. She said:

> *"They are incorporated into our subject planning which is content specific and at the task at hand. So, if we are teaching vocabulary, we are going to use it but if we are teaching visual work, we aren't going to use it. Some teachers are more open to use technology; therefore, they can incorporate it better into their planning where as other teachers don't use it as much in their planning as they aren't so open with it."*

One of the popular uses of mobile technology that teachers mentioned is for creating presentations for their learners and to research content to teach to their learners. They also use mobile technology to watch videos of the different content they are teaching. It is evident that teachers are finding ways to make difficult concepts easy to learn in order for them to develop the existing knowledge of learners. Teachers mentioned the following in terms of how they use mobile technology in preparing for lessons:

> Participant 6: *"I use it to do research, for audio books such as listening comprehensions. I use it to create PowerPoints as well."*

> Participant 2: *"Sometimes I would Google a different way to present a lesson even better – or find a short video to show the learners how someone else did what I want to teach the learners on the day."*

Participant 1: *"I use it for PowerPoint presentations and to project videos related to concepts. I use the device itself to create a learning path for the learner. For example, through movies and documentaries."*

There are many pedagogical techniques that the teachers use in the classroom. One of the pedagogical techniques that is used by Participant 3 is the flipped classroom approach where learners have access to the content and lesson before they come to the classroom. She described her lesson planning as follows:

"I will set up a Kahoot test as part of revision. I will download videos on a specific lesson. I also create online resources for them to access at home before we introduce the topic in the classroom – like a flipped classroom approach."

Not only is the created content being made available to the learners, but teachers also have access to content. Participant 3 mentioned how she created PowerPoint presentations for the teachers and learners to access and how she made use of the flipped classroom approach. She said the following about using mobile technology in her lesson planning:

"Always. Everything I do is digital. For example, I will create a PowerPoint and then send it to all the teachers that teach that grade. Whatever content I have made available I will send it to the other teachers and at the same time I upload the information onto the student's tablets so that they can access it as well. The point is for them to have the material before we come to class."

Another approach that one teacher uses is collaborative learning. Learners work together in learning and solving problems. As seen in the lesson plan in Table 3, learners are divided into groups or pairs in order to complete the multiple-choice test that was pushed onto the miEbooks application. They must work together to make sure that they find the answer to each question.

Table 3: Lesson plan for Mathematics showing how mobile technology is used

Mathematics **DATE: 16/04/2019** **GRADE: 8**	**TOPIC: Algebraic Expressions** **THEME: Revision of Algebraic Expressions (From class Test 1)**
LESSON OUTCOME(S): At the start of this lesson the learners should already know the meaning of the terms: variable, exponent, coefficient, decreasing or increasing powers of a variable. They should also know what the terms are for the different amounts of terms in an expression (monomial, binomial, trinomial, polynomial) and can do substitution with a variable, arrange an expression into decreasing powers of a variable. The learners are also supposed to be able to add or subtract like terms in an expression. By the end of the lesson the learners should be able to remember their prior knowledge from what we did in this topic. The learners should also learn from the mistakes that they made on their class tests.	
LTSMs (Educational media) - PowerPoint Presentation - Worksheet made by me **Bibliography (abridged Harvard method) of All sources consulted** Bowie, L. (2012). *Platinum mathematics*. 29th ed. Cape Town: Maskew Miller Longman, p.102-123 Senior Phase Mathematics CAPS document	

LESSON PHASES: **THEME (Context; big idea):** The learners are learning and realising their mistakes by playing a game in class after we did the corrections for class test 1. Learning by group work and a game. **INTRODUCTION (Time allocated 15 min)** As an introduction, I am going to revise algebraic expressions by doing the corrections with them on their class test 1.

DEVELOPMENT (Time allocated 20 min)

I am letting the learners do the multiple-choice test that I set on their miEbooks app on their tablets in groups. They have to work together to find the answers of each question. They also need to keep on trying to do the activity until they almost get full marks for the question.

CONSOLIDATION (Time allocated 10min)

I saved the questions on a Word document so that we can go through the questions by the end of the class. As consolidation I will revise everything while I do the questions on the board after the learners tried it by themselves.

The lesson plan in Table 3 shows how mobile technology is being integrated in the lesson. The teacher uses a PowerPoint presentation to explain certain mathematical terms to the learners. This presentation will be pushed onto the learners' miEbooks application on their tablets. The learners use their tablets to complete the multiple-choice test. The teacher has saved the questions in a Word document and the learners will also have access to it on their tablets. The teacher has made the lesson more enjoyable for the learners by making them play a game in which they learn while also learning mathematical terms at the same time. The teacher has successfully used the TPACK model in the lesson plan. In order to reach the outcomes of the lesson, the teacher used a multiple-choice game for the learners to play on their tablets which therefore incorporates the components of the TPACK model.

4.4.2 Theme 2: Relevance of mobile technology in the classroom

The theme regarding relevance of mobile technology in the classroom highlights the benefits that teachers have experienced when using technology. This is one of the important themes where teachers could say whether using mobile technology in the classroom was relevant for their teaching and learning. The sub-themes discuss the benefits that teachers have seen when using mobile technology and the perceptions of learners as viewed by the teacher.

4.4.2.1 Benefits of mobile technology

The introduction of mobile technology in these private schools played a role in seeing whether this technology benefits teaching and learning. Teachers have begun to see the many benefits that mobile technology has in the classroom (Adeboye, 2016). Teachers listed many benefits of using mobile technology in the classroom, as shown in Figure 7.

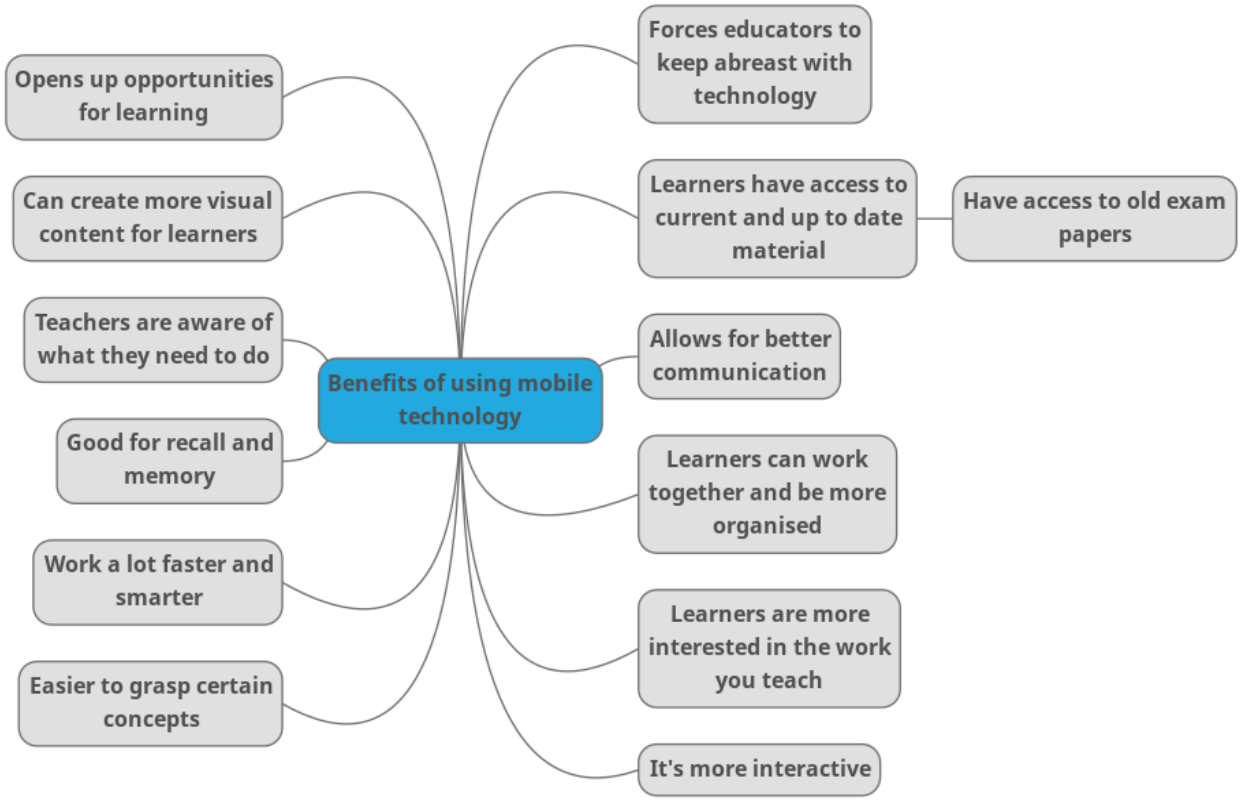

Figure 7: Benefits stated by teachers of the use of mobile technology

One benefit that Adeboye (2016) notes is that mobile technology allows for faster and easier communication between teachers and learners. This same benefit was reiterated by many of the teachers in the study. They said:

Participant 7: *"… better communication between the pupil and the teacher."*

Participant 8: *"In my subject it does benefit as it is essential. We work a lot faster and smarter. I have got their work on Google Classroom."*

Another teacher mentioned how she uses her cell phone to communicate with learners and that they submit their assignments to her in this manner.

Participant 4: *"I also have a separate work phone. On that phone there are groups of the classes that I teach. They can submit privately to me. So, they are constantly in contact with me and they can also ask me questions about the work we did in class."*

Additionally, teachers have begun to allow learners to submit their assignments electronically. This is beneficial for those learners who may have been absent, but can still submit their work to their teachers or catch up on missed work. On how learners can submit their assignments, Participant 4 mentioned that learners are required to submit a hard copy to her, with the exception of those learners who cannot provide a printed copy.

"With me my rule is that learners have to present a hard copy. They have to have their assignments typed out so that is a requirement that we have in the English department. And the students that are unable to get their assignments printed I do allow them to send an electronic copy to me."

Teachers were positive towards listing the many benefits they have experienced in using mobile technology in the classroom. Participant 4 mentioned how she has seen an improvement in her learners through the use of mobile technology in the classroom. She said:

"I've seen an improvement with my lower levels … I can show you from the first-term results to their second-term results how it is improved."

Mobile technology is beneficial when learners enjoy using the device. How a learner adapts to using mobile technology leads to teachers successfully using the device in their teaching. One of the benefits mentioned by teachers is that mobile

technology opens up new opportunities for learning, therefore some teachers can cater for learners on lower, middle and higher levels of development. Participant 1 revealed that when learners use mobile technology "*they are able to track their cognitive development based on the path of his or her learning".* This allows learners to be in control of their own learning and have a variety of ways to access content and communicate with their teachers outside of school.

Learners having access to resources and materials is a common benefit that most teachers shared. These resources and materials are "*current and up-to-date",* which they can access any time. Resources such as revision worksheets, documents, slideshows and videos help learner to understand more about the content and to revise the content in their own time.

4.4.2.2 Learners' perceptions of technology as viewed by teachers

Teachers see learners daily and are able to observe their progress and their use of mobile technology. Through their daily interaction with learners, teachers can provide a lens on the learners' perceptions towards using mobile technology. One advantage that teachers highlighted was that mobile technology is relevant to the learners today as *"they are constantly on their devices and it's easier for them to grasp certain concepts by using technology rather than the old-style lecture method".* Another teacher mentioned that creating slideshows for learners is a visual way to make learners understand certain concepts. Participant 6 said:

> *"Our world has become very visual and we like creating PowerPoints for learners to make it easier for learners to understand."*

Teachers are always trying to find new and exciting ways to make learning fun and easier for their learners. One teacher, in particular, has created interactive PowerPoint games for her learners. She mentioned that learners love using technology, especially when playing games.

Participant 4: *"All my classes are lower level so I use games to sort of help with their comprehension skills, to help with target language not just the meaning but the idea of what it is we are teaching."*

When asked whether the different programs or applications help with the learning process, teachers shared similar views on how learners enjoy using the technology. Teachers said:

Participant 3: *"Learners tend to remember better because it is relevant to them as they are constantly on their devices. It's also more fun for them. It's not just me standing in front of the classroom teaching, they get to self- explore.*"

Participant 6: *"I've learnt that the creative learners enjoy it more – the right brained- whereas the left brained learners prefer structure."*

Games seem to have advantages in the classroom, especially for content that involves recall and memory. Participant 4 enjoyed using games in her classroom to an extent where she has created her own games. She saw that *"you can create a personality with the students"* through the interaction with games. She observed how her junior learners enjoyed competing with one another and she has also *"seen an improvement"*. Another teacher shared how learners became *"very interested if they're going to play or do something interactive"* in the lesson.

Interaction seems to play a role in the successful use of mobile technology. One teacher noted how she has seen learners who do not normally interact with one another outside of the classroom now interact with their peers in the classroom, due to the collaborative learning environment she has created.

Participant 4: *"I enjoy watching the students who may not interact with each other outside the classroom but interact with each other in the classroom."*

Participant 5 also shared her view on learners interacting with one another. She says:

"All the learners work together and they are more organised."

Not only can learners interact with one another and the teacher in the classroom, they are able to do so at home. A teacher shared that she noticed that some learners liked to communicate with the teacher and ask for help when doing homework. They also asked for assistance regarding the work that was done in class, with which the teacher could further help them. Communication platforms such as Google Classroom and WhatsApp groups also allow learners to help one another to understand certain concepts.

In contrast, communication becomes unsuccessful when learners do not receive notices or information, due to them not having data or access to Wi-Fi at home. One teacher mentioned that *"some learners don't have data or internet access at home".* This seems to be an issue that was raised among teachers, as learners often come to school with incomplete homework or miss out on important information.

One shared perception of learners that teachers observed is that learners are more *"interested in the work that you teach"* when using mobile technology. A lot of the time, learners become bored and lose focus when you teach. A teacher mentioned how she *"hardly uses the whiteboard"* as she loses the learners' attention whenever she turns her back to write on the board. By using different mobile technology applications, she noted that not only did it spark their attention, but the learners were all able to learn at the same level and could work together, using the device.

> Participant 4: *"It grabs their attention. It stimulates learning in the classroom. It allows all the learners – irrespective of the level they're at – to be on the same level. It doesn't discourage other learners; it is inclusive and very much collaborative."*

A similar view was shared by another teacher who mentioned how using the different applications and programs has helped learners become more creative in the subject EGD. He also mentioned how new learners from other schools were amazed at what their school was doing with regard to using mobile technology. Participant 8 said:

"It is a visual aid and adds a lot more to the classroom experience … You can see the difference. When they get to design, they get more creative and enjoy it … Some learners at other neighbouring schools that come to this school are amazed at what is being done at this school."

However, another teacher observed that her learners struggled to use the device, which led to them not having an interest in using the device at all. This becomes an issue for learning if learners cannot use the device and applications to its full capacity. She said that some learners *"tend to give up and pack away their tablets"* when they are faced with problems that they cannot fix.

4.4.3 Theme 3: Mobile technology in the classroom

The final emergent theme addresses mobile technology in the classroom as a whole. In this theme I discuss the views and opinions that teachers had on using mobile technology and how these views influenced teaching and learning. I discuss the many challenges that teachers face in using the devices and how these challenges affect their teaching and learning. Lastly, I focus on the teachers' knowledge of using mobile technology and how this knowledge is used in their teaching.

4.4.3.1 Teachers' perceptions of mobile technology

Teachers' perceptions of using mobile technology influence their attitudes and behaviour towards using the devices in their teaching and learning. When teachers were asked whether they enjoyed using mobile technology, the majority of them felt positive using mobile technology in their teaching. They indicated that they *"enjoy using technology, it makes teaching and learning easier".* One teacher summarised what the other teachers said regarding this perception. Participant 3 stated:

"I am very positive. I think it can have a big impact in the current age that we are living in – 21st century. I think when it is implemented you need to have a strategy on how to implement it and follow through on it. You need to make sure that all the learners are equipped with the necessary devices and that teachers are trained to use these applications and technology."

This view regarding the usefulness of mobile technology is further illustrated in Figure 8. Many of the teachers agreed that mobile technology makes it easier for them to do their job. Not only does it make it easier for the teachers to do their job, but it is *"encouraging and stimulating".* It also allows teachers to accomplish more work and saves valuable time in preparing for lesson and in their teaching. Therefore, teachers have found it very useful to use mobile technology in the classroom.

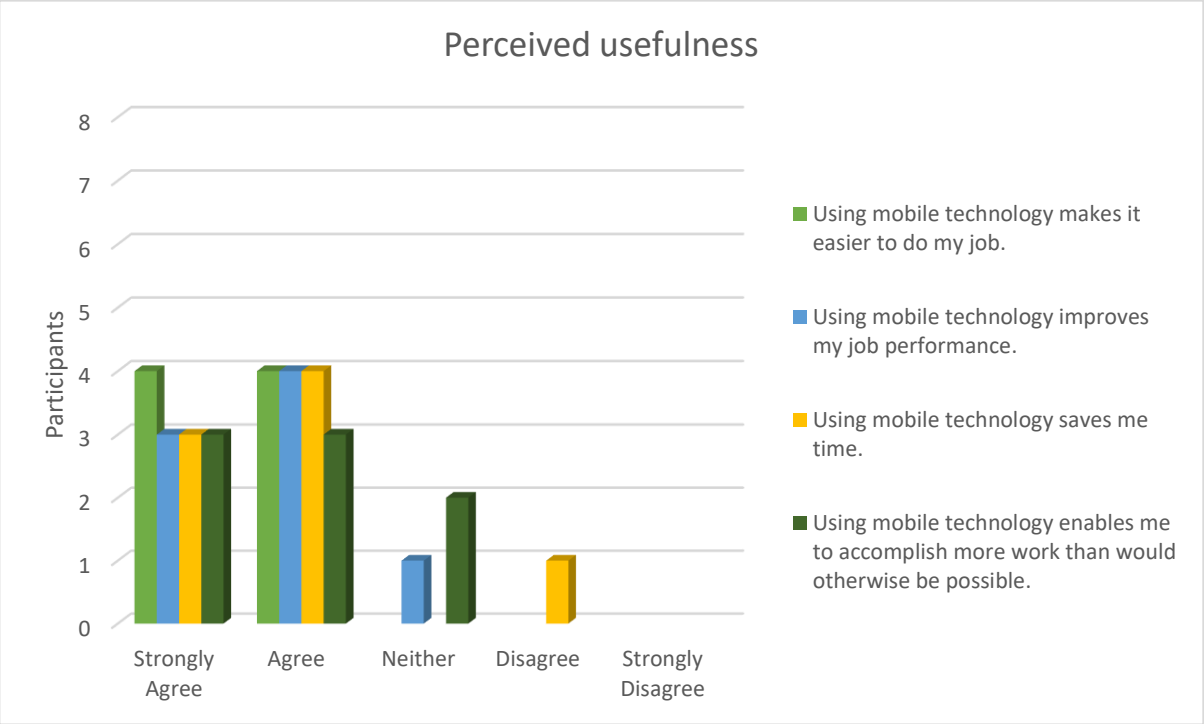

Figure 8: Teachers' perceived usefulness of using mobile technology

Table 4: Numerical representation of teachers' perceived usefulness

Perceived usefulness					
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
Using mobile technology makes it easier to do my job.	4	4			
Using mobile technology improves my job performance.	3	4	1		
Using mobile technology saves me time.	3	4		1	
Using mobile technology enables me to accomplish more work than would otherwise be possible.	3	3	2		

In addition, teachers mentioned how useful it is to use mobile technology in teaching and learning. The majority of teachers commented on how useful it has become for them to give learners resources on their tablets as opposed to printing out worksheets and documents, which some learners tend to lose. Participant 2 had this view:

> *"I must say, if I forget to send something to be printed and I can just share it on their tablets – it makes my life a lot easier. It's also beneficial for the learners who always lose papers and worksheets we give them."*

Participant 1, who teaches Life Sciences, remarked that whenever substances and materials are not available to use in the lesson, she is able to show a practical video. However, she did mention that doing a practical lesson is beneficial. She said:

> *"In cases of equipment or substances not being available, YouTube videos comes in handy, otherwise hands-on is engaging and gets the senses involved as well."*

When asked about how the teachers' perceptions and views influenced their teaching and learning, teachers shared similar views on how the world is forever changing and how they needed to adapt in order to meet their learners' needs. Teachers said:

> Participant 6: *"You are forced to think differently. The world is forever changing and we are preparing learners for university."*
>
> Participant 8: *"I enjoy my teaching and learning. It doesn't matter whether it's positive or negative. We need to adapt to the changes and be positive."*
>
> Participant 3: *"In a positive way. I have learned different ways to carry content over to the learners and teaching them in different ways that accommodate different learning styles."*

Teachers also mentioned how useful it is to communicate with learners using the different applications such as the ITSI portal, Google Classroom and WhatsApp. Teachers are also able to upload resources to assist learners in their learning and allow them to revise the work that was done in class. It also allows the learners to receive immediate feedback when they have completed a test. Participant 2 said:

> *"… especially if the learners do the multiple-choice tests and I set the answers to be given as feedback after they attempted the test – they can learn from their mistakes. This also makes it a lot easier to distribute revision documents to the learner without printing them."*

Despite many teachers sharing their positive opinions and views about the usefulness of mobile technology in the classroom, some also shared their negative opinions about mobile technology. One of the teachers shared a negative view, highlighted by colleagues, namely that the device was becoming a distraction to the learners. Teachers felt that learners had no self-control in using the devices. This has led to some teachers avoiding the use of devices in the classroom. Participant 1 summarised this view by saying:

> *"… my observations have taught me that learners are not responsible enough to understand the importance of the device in terms of learning … I have*

occasionally avoided the use of the tablet to prevent distractions and to continue with content."

In addition, teachers also mentioned how some learners found it difficult to use their devices to access the textbook and that many of the learners still preferred the hardcopy textbook. Using technology in the classroom is not useful in all aspects, as some teachers stated. They *"… still want learners to be able to write, highlight and create their own mind maps, instead of staring at the computer screen the whole time."* Teachers said about using mobile technology:

> Participant 6: *"Seeing it as an aid and not as a crutch. Understanding that it has its place. At the end of the day they are not going to write their exams on their device so we still need to teach them the basics of handwritten work."*

> Participant 7: *"It is useful with its limits. It has to be used as an aid and not a liability."*

Participant 4 highlighted that some teachers were not as comfortable in using technology as others. Because she was a young teacher and was well versed in using technology, she has been able to offer digital training to ensure that other teachers were comfortable with using this technology. She noted that there was a "*huge gap among generations in using technology".* She further said:

> *"Some other teachers' attitudes are not positive. I think it's the idea of 'we don't want to try something new because we are too scared and we don't know how to'. No one wants to look like they don't know what they are doing. I don't know if it's a generation thing or it's a teacher thing."*

In order to successfully adapt to using mobile technology, teachers need to be comfortable with using the device itself. The survey results in Figure 9 show that many teachers felt comfortable in using mobile technology since it did not require a lot of their mental effort. Some teachers had experience with using mobile technology as *"it*

comes naturally" and one teacher noted she was *"technologically savvy, so it's very easy for me to use it and incorporate it into my lessons".*

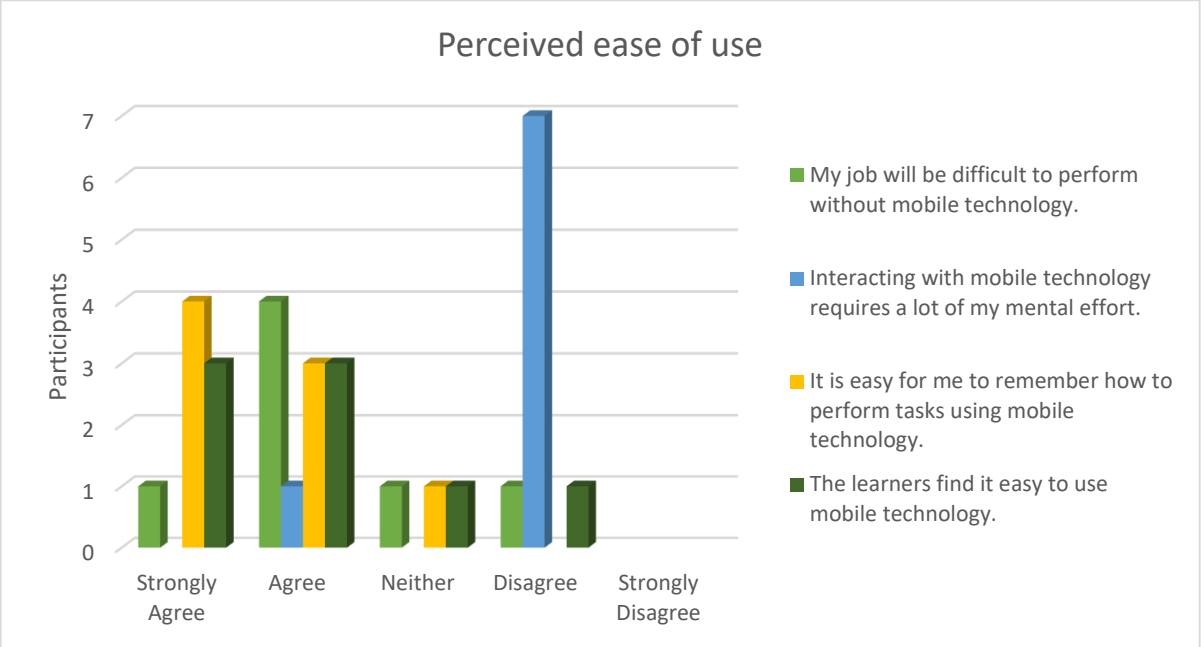

Figure 9: Teachers' perceived ease of use when using mobile technology

Table 5: Numerical representation of teachers' perceived ease of use

Perceived ease of use					
	Strongly Agree	Agree	Neither	Disagree	Strongly Disagree
My job will be difficult to perform without mobile technology.	1	4	1	1	
Interacting with mobile technology requires a lot of my mental effort.		1		7	
It is easy for me to remember how to perform tasks using mobile technology.	4	3	1		
The learners find it easy to use mobile technology.	3	3	1	1	

Many of the teachers mentioned that using mobile technology in the classroom becomes easier when everything is in place and working. Having poor connectivity issues influences them negatively as they cannot use it in their lessons. This seems to be an issue and a challenge that changes teachers' behaviour and attitudes in using the device. Participant 3 said:

> *"It's quite easy if everything is in place – if learners have devices and internet access then it becomes easy to implement technology into my lesson."*

4.4.3.2 Challenges using mobile technology

Mobile technology adoption cannot be successful if there are numerous challenges that teachers face when using these devices in their teaching and learning. Mehdipour and Zerehkafi (2013) listed many challenges that are faced by teachers when using mobile technology. These challenges are in line with the responses from some of the teachers in this study. One of the biggest challenges that all of the teachers mentioned was connectivity and power outages due to load shedding. This affects teachers and learners by not being able to access and give content to the learners. Due to this, teachers are forced to have backup plans such as printing out hard copies of the work. Participant 3 confirmed:

> *"You have to have a backup plan. If you have planned your lesson using technology, then you will have to print out certain things if they had to look at them online."*

Participant 8 mentioned how their school was trying to fix the challenge of power outages by installing solar panels in each classroom. This will help teachers and learners to connect to the school's network and work can continue as normal. It will also help in that fewer devices will be damaged due to these power outages. Concerning these challenges, he said:

> *"They will always be there. The school is looking at putting solar panels in the classroom. Something gets damaged when the power goes out."*

Another challenge that teachers mentioned was that learners had no self-control in using the devices for learning purposes. Learners are constantly playing games and are on social media due to easy Wi-Fi access. This makes many of the learners become easily distracted and it is difficult to monitor what each learner is doing on his/her device. The effect of this challenge in teaching is that it "*requires constant supervision which hinders progress in large classes"*. Teachers said:

> Participant 8: *"Their mobile devices can become a distraction – learners can go on different social media sites during teaching and learning."*
>
> Participant 6: *"It's difficult to control learners in using technology the way they're supposed to be using it for. You cannot stand behind every child in a lesson so there must be an element of trust."*
>
> Participant 7: *"You cannot control what learners have on their screen."*
>
> Participant 1: *"… it is a tool that is misused by the learner and therefore negatively influences their ability to focus and concentrate on the task at hand … Too many distractions as they have access to Wi-Fi connections … Some learners are busy with games and other videos instead of what is being discussed in class."*

The battery life of the device seems to be an issue for learners and teachers. Learners are not permitted to charge their devices in the classroom; therefore, their devices must be fully charged by the time they come to school. This issue was raised by some of the teachers who mentioned that their tablets are not charged and therefore learners cannot work in the classroom. In relation to not being able to work due to the battery life of the device, a teacher mentioned that some learners forget to bring their devices to school or their devices are broken. One teacher mentioned that learners *"will need to be provided with a device if they don't have one".*

Competence in using the device and certain applications seems to be a challenge that teachers face in the classroom. One teacher mentioned that some learners do not know how to use Chromebooks, especially the juniors and new learners who come

from other schools. Participant 6, who is an English teacher, noticed that some learners struggle to use Turnitin the first time. Participant 2 said the following about learners struggling to use the device:

> *"Some learners aren't as good with technology as others. Some can fix their own problems on their tablets and others just give up and pack their tablets away."*

Using the ITSI portal requires constant updates of the learners' electronic books. Teachers mentioned that some learners were not able to download a new version of their electronic books, or their application may be out of date and the network would not refresh the miEbooks application. Participant 8, who is an EGD teacher, mentioned that the size of the program that he uses cannot work on older devices.

Time plays a huge role in using these devices in the classroom. A teacher felt that it is very time-consuming and tedious to *"set everything up and get ready"*. One of the applications that most of the teachers use is Kahoot which some find difficult to use in their classrooms. Reasons such as too many learners trying to connect to the game and network issues make it impossible for the game to be successfully used in the classroom. Therefore, some teachers found it easier to work in groups or pairs when using the device to prevent everyone from struggling to connect. Teachers said:

> Participant 2: *"It's difficult to use that in the classroom, because it takes very long for everyone to 'join' the 'game' on a Kahoot and we won't know if the learners are actually busy with Kahoot or with a game … I learnt to do more work with them in pairs and to group them in different ways."*
>
> Participant 4: *"… when we are playing the games. When we are doing the games to connect. Most of the time it's in groups as my classroom is set that way, so it won't be all the students on their phone. It will be one group member who will be on their tablet or phone…. They would have to connect for example one of the games we use a lot is Kahoot – that's a general game that's been made. A code will be put up and then they would have to log onto the website*

using that code. So, it will be used for that specific game. A lot of the other times, like I said if we have an interactive group game one person at a time will be using the device."

In addition, one teacher suggested that having clear instructions and a very clear time allocation can help with using your time wisely in the classroom. Teachers need to adapt and make other plans that will prevent them from 'wasting' time through connection issues. It is also easier to use the devices with a few learners, rather than having the entire classroom connected at once.

4.4.3.3 Teachers' knowledge of mobile technology

It is evident that teachers are widely using mobile technology in the classroom to help with their teaching and learning. However, there seems to be a lack of knowledge on how to effectively use the device itself in the classroom. Many of the teachers shared that they have received training on how to use the ITSI portal for its e-books application and Google Classroom. When teachers were asked whether they had received training at school with regard to mobile technology, many of them mentioned that they did receive training. However, one teacher highlighted the fact that there was no training in using the device itself. Teachers said the following regarding training:

Participant 7: *"Google training for programs but there's no actual training for the device itself."*

Participant 5: *"In the beginning there was training. There are staff development sessions once per month. These focus on technology and the sessions are very helpful."*

Participant 6: *"We have Google training that is offered by the school."*

Participant 2: *"The ITSI support staff visit the school very regularly and ask learners and teachers if anyone needs assistance with their tablets."*

Training plays a role in teachers' attitudes towards using mobile technology in the classroom. Teachers have noted how helpful training is and how it influences them in

finding a variety of ways to use the device. Several of the teachers mentioned that training has influenced them positively and they have found a variety of ways to teach learners by using mobile technology. Other teachers also mentioned that training allowed them to plan lessons to meet learners' learning needs, regardless of which level they are at. One teacher expressed this view:

> Participant 4: *"It allows you to sort of scaffold different materials to see where you are as teacher and where you need to be. It also allows you to have more fun with the teaching content – so it's not about standing in front of the class and telling you this is what you need to learn. It's also another way for you to integrate with the learners."*

However, there are some teachers who mentioned that they did not receive adequate training and have therefore taken it upon themselves to offer training to other teachers in the school. One teacher mentioned that it is important for teachers to be able to use technology if she has created certain content for them. Teachers need to have knowledge on how to use the different programs or applications so that it can be applied successfully towards learning in the classroom. She also noted that there were some teachers who were afraid to use technology because they were afraid of not getting it right in front of their learners. Participant 4 said:

> *"There is no formal training. I did do training for the teachers on digital learning in the beginning of the year. I wish there was some formal training ... We have tutor groups where we have tutor lessons on a Wednesday afternoon and a lot of the games I have created are digitally based, but that cannot be successful if the teacher is not sure how to use it …"*
>
> *"It made me realise the discrepancies in utilising technology. It made me realise there is a huge gap among generations with regards to using technology. It also made me realise there is not sufficient training made available. It necessarily didn't change the way how I conducted my classes but it does affect me in a sense where I feel like I cannot produce a lesson that are too complicated as the other teachers are not on the same technological level as me."*

"We as teachers provide training to other teachers to introduce them how we use certain applications and how they can incorporate them in their teaching."

Although teachers receive training from the school, and in some schools the IT department is there to assist some teachers with their devices, it seems there is a lack of training in how to use the device itself, not only among teachers but among learners as well. Furthermore, the amount of training teachers receive is inadequate. One school does monthly training with the focus only on Google, whereas other schools have training once a year or none at all. It is clear that some teachers have taken steps to improve their professional development by completing courses, such as Participant 4. Other teachers have prior knowledge of using devices through their previous employment, such as Participant 1 and Participant 6 who have *"used mobile technology at previous schools".*

4.5 CONCLUSION

This chapter presented and discussed the data that were collected for this study. Data were analysed to identify themes and sub-themes related to the research questions for this study. The data provided teachers' perceptions regarding the use of mobile technology in the classroom, challenges that they found in using the devices and how they used it in their teaching and learning. Findings from the data highlighted how teachers adapted to using mobile technology, how it affected their teaching and learning and, lastly, whether they found it beneficial to use the device in the classroom. It can be concluded that mobile technology in private schools has its benefits and is a tool to which teachers have learned to adapt for their teaching and learning. Although there were many challenges presented in the findings, teachers are continuing to use the devices despite these challenges.

CHAPTER 5: RECOMMENDATIONS AND CONCLUSIONS

5.1 INTRODUCTION

The previous chapter presented the findings of the data that were collected and the different emerging themes. This final chapter provides a summary of the findings and the final conclusion of this study.

Mobile technology has become a fast developing tool in the field of ICT to use in the classroom (Ferreira, Moreira, Santos-Pereira, & Durão, 2015). Teachers and learners have access to information on their devices and this allows learners to explore their learning potential (Ferreira et al., 2015). It is important that mobile technology is used effectively in the classroom as it will then benefit the learning process of the learners. This study focused on teachers' adaptation to using mobile technology in their classrooms. It aimed at finding out the challenges, benefits and the many uses of mobile technology in teaching and learning, according to the teachers' perspectives.

This final chapter summarises the entire research and discusses the main research conclusions in relation to the research questions. It further discusses the limitations of the study and provides recommendations for future research. Lastly, the chapter ends with the final conclusion.

5.2 SUMMARY OF THE RESEARCH

This study aimed at investigating how teachers in private schools have adapted to using mobile technology in the classroom. It looked at teachers' perceptions and attitudes towards using mobile technology and highlighted their perceived benefits and challenges when using these devices.

Chapter 1 provided an introduction to the research by providing the overview of the study. The background and context of the study were discussed, which was followed by the rationale and the problem statement. These highlighted that private schools were introducing mobile technology into their teaching and learning; however, the

devices were not being adequately used. This led to the main research question and the sub-questions that provided a guideline for this study.

Chapter 2 focused on the literature review and the theoretical framework for this study. The literature review provided a background on mobile technology and the introduction of e-learning in education. It discussed the integration of mobile technology in the classroom and the benefits and challenges of mobile technology. This chapter also looked at e-learning trends in South African education. Thereafter the TPACK model was discussed in depth, which provided insight as to how teachers should integrate technology into their planning, by using the model. The technology acceptance model was the theoretical framework for this study and each of its components was discussed. This framework showed how teachers' perceptions of the usefulness and ease of use of technology can influence their attitudes and behaviour towards using that technology.

Thereafter Chapter 3 provided a detailed discussion of the research methodology that was used for this study. This study used a qualitative approach which aimed at finding out the behaviour of people (Hancock et al., 1998). An explorative case study was used as the research design for this study. The interpretivist paradigm was used in order to construct meaning from the participants' responses and this was done through semi-structured interviews and a survey. All the interviews were recorded and transcribed. The sample and population were purposefully selected from three schools in Centurion and the participants consisted of various teachers from these high schools. Ethical considerations were briefly discussed in relation to credibility, transferability, dependability and confirmability.

Chapter 4 presented a detailed report on the interpretation and the analysis of the data that were collected. This chapter discussed the emerging themes that were identified through the semi-structured interviews and the survey. The themes were divided into prominent themes and sub-themes, which were grouped according to the research questions.

Lastly, the final chapter discusses the overview of the study. This chapter highlights the main findings from the analysed data. It also discusses the main research conclusions, limitations of the study and recommendations based on the findings of the study.

5.3 THE MAIN RESEARCH CONCLUSIONS

This section summarises the data collected through semi-structured interviews and a survey, which were used as evidence in providing answers to the main research question and sub-questions.

Main research question: How do teachers in private schools adapt to the use of mobile technology in their teaching?

The aim of the main research question was to explore how teachers – specifically in private schools – have adapted to using mobile technology in their teaching. The teachers who were selected in the study taught from Grade 8 to Grade 12 and have all been using mobile technology in their teaching. Teachers shared their challenges in and perceptions of using mobile technology and how they have adapted to using mobile technology. The four sub-questions that were used to address the main research questions provided an insight into the teachers' adoption of mobile technology.

5.3.1 Teachers' use of mobile technology in the classroom

The findings revealed that teachers were actively using mobile technology in their everyday teaching. Many of the teachers used tablets for accessing the electronic textbooks, communicating with learners and uploading resources for their learners. Furthermore, tablets and cell phones were also used to play educational games, which is an exciting way for learners to grasp certain content. However, the study also revealed that mobile technology was not used to its full potential in the classroom, due to the lack of training received in using these devices.

5.3.2 Challenges faced by teachers when using mobile technology in the classroom

The main challenges that were shared among all the teachers were connectivity issues and power outages. This influenced teaching and learning in the classroom and prevented teachers and learners from accessing important information and resources. Other challenges, such as the devices' battery life not lasting and broken devices, also hindered learning in the classroom. The study also revealed that schools are not involved in fixing these challenges, with the exception of one school that was looking into installing solar panels in the school. Furthermore, access to social media and games is another challenge faced by teachers, as learners become distracted in the classroom and begin using their devices for social purposes and not for learning. The study revealed that one school's introduction of Chromebooks proved to be beneficial as it is run by the Google operating system, therefore learners cannot install social media applications and games.

5.3.3 Teachers' perceptions of the usefulness and ease of use of mobile technology

The study established that teachers found it very useful to use mobile technology in their teaching. Sending content and worksheets and communicating with learners on their devices were revealed to be very useful for these teachers and made teaching and learning a lot easier. It was also found that many teachers used technology in their everyday life and it was therefore easy for them to use these devices. Having these handheld devices has improved the job performance of the teachers and has allowed them to accomplish a lot of work in the classroom. Through sufficient training, teachers were able to see how they could use the device in the classroom and how they could communicate better with their learners, by means of the ITSI portal and Google Classroom.

However, one teacher pointed out that some teachers were not as comfortable in using technology as others as they did not know how to use their devices properly. The older generation of teachers were reluctant to use these devices and were not positive towards using them. It is therefore important that these teachers are trained to use

these devices in order to change their negative attitudes towards them. Although many teachers stated that using mobile technology was very easy for them, there seems to be a lack of knowledge how to successfully incorporate it in teaching and learning.

5.3.4 Teachers' attitudes towards using mobile technology

The study found that teachers had a positive attitude towards using mobile technology. Many of the teachers have seen the benefits of using mobile technology and have enjoyed incorporating it into their teaching and learning. The study also revealed that teachers' attitudes towards using technology changed when they were faced with challenges. It found that not being connected to the schools' networks negatively influenced teaching and learning and led to teachers not wanting to use mobile technology in future teaching.

5.4 LIMITATIONS OF THE STUDY

This study was conducted in three private schools in Centurion in the Gauteng Province. Therefore, the findings of this study are not a general representation of all private schools in South Africa. Consequently, if a lager sample were selected, the research could have provided a broader spectrum of teachers' perceptions and attitudes towards and their experiences of using mobile technology.

5.5 INFLUENCE OF THE SELECTED SCHOOLS ON THE FINDINGS OF THE STUDY

Selecting the schools for the study heavily influenced the findings. School A and School C introduced mobile technology in their schools five or six years ago. These schools were more experienced in using mobile technology and therefore could provide data that were beneficial for the study. They were able to provide information about how mobile technology has developed since its introduction and whether the school has provided solutions to the many challenges that teachers faced. One of the findings of these schools was that teachers were very positive towards using mobile technology in the school as they have found a variety of ways to integrate it into their teaching. The training provided in School A influenced the teachers' attitudes towards

using the devices and they were more positive in using the devices. Although School C did not offer training, the teachers provided their own training for other teachers because they enjoyed using mobile technology in the classroom and wanted to share that enjoyment with their colleagues.

The findings in school B were very interesting. The school is new and therefore it provided a fresh perspective on how teachers adapted to mobile technology when it was first introduced. Teachers were negative towards the use of mobile technology as they were not familiar with using the devices in the classroom and faced many challenges. These challenges influenced the teachers' attitudes and behaviour towards using the devices. With no experience of mobile technology in the school, it was evident that the teachers were reluctant to use the devices and saw them as a distraction rather than an aid towards teaching and learning.

5.6 RECOMMENDATIONS

5.6.1 Recommendation 1: Training for teachers and learners

One of the findings is that teachers did not get sufficient training in mobile technology. Training plays a role in whether teachers are able to use mobile technology in their teaching and learning. Although there were some schools that did offer training, the training was of little value to the teachers in using the devices. Teachers need to be adequately trained in mobile technology use. Schools need to invest more in training their staff to successfully use mobile devices in the classroom. This training must focus on how teachers can use different programs and applications to enhance teaching and learning. Training must provide a variety of demonstrations on how teachers can incorporate the mobile device in their planning. This will encourage teachers to use the device for more than just a substitute for the hardcopy textbook.

Not only teachers should receive training, but learners need training in how to use the device itself. The study found that some teachers observed that learners were not able to use their devices. This is important, especially when it comes to teachers using these devices in learning. All learners need to be on the same level of competency as their peers. This will allow them to use mobile devices more often and more creatively

in their learning. Schools should look into training their learners because they also play a role in the successful use of mobile technology in the classroom.

5.6.2 Recommendation 2: Contingency plans for network issues, power outages and battery life of devices

Two of the main issues that teachers raised were connectivity issues and power outages. South Africa has been experiencing load shedding in the past couple of years and it has affected many schools around the country. Teachers cannot use their mobile devices when there are power outages and connectivity issues and this hinders their teaching and learning. It is therefore important that schools look into alternative plans to ensure teaching and learning continues, despite network and power issues.

Schools can begin by installing solar panels around the school. Although this may be costly, it will allow teaching and learning to continue by using off-grid, solar power. Teachers and learners will still be able to connect and use their mobile technology during power outages. Another option is to buy generators that will ensure that teachers and learners are connected to the network and there can be power in the classroom. These generators will ensure that the school has a stable amount of power supply that will allow the school to continue using technology to operate.

The battery life of mobile devices does not last a full school day, especially if the device is old and used very often in the classroom. Schools can install desktop charging stations inside the classrooms. These stations can charge ten devices at a time and are safe to use. Schools can also install solar power charging stations around the school. This is a budget-friendly option that will save the schools money towards their electricity bill. Schools can invest in creating their own solar-powered backpacks which learners can use throughout their schooling years. Furthermore, schools need to encourage learners to carry fully charged power banks to school as a backup for when they have low batteries.

5.6.3 Recommendation 3: Use of students as tutors in the classroom

One of the issues teachers had was learners using their devices for games and accessing social media during lessons. Private schools can hire students as tutors in the classroom to assist teachers with monitoring the learners' use of their tablets. These students can also assist the learners with using their devices, as well as with the content of the work in the lesson. More attention can be focused on learners who are struggling with the content work and to make sure learners are focused on the tasks at hand. Schools can either pay the students for their tutoring or they can allow students to become student teachers as part of their teaching practice.

5.6.4 General recommendations

- Teachers' professional development is important and therefore frequent training will allow teachers to grow professionally.
- Teachers must be willing and have an open mind in using mobile technology in their classroom, which will allow them to creatively use the device in their teaching and learning.
- Learner perceptions regarding mobile technology need to be investigated to find ways to accommodate them in their learning.
- Further research can be done on government schools' adaptation to mobile technology in comparison with private schools.

5.7 FINAL CONCLUSION

This study aimed at discovering whether teachers found it beneficial to use mobile technology in their teaching and learning, more specifically private school teachers in the high school. Mobile technology has become a tool to use in the classroom and with many private schools introducing it into their classroom settings, it plays a role in stimulating learning in the classroom. Teachers play a role in the successful use of mobile technology in the classroom and therefore it is important to understand teachers' perceptions, attitudes and views regarding mobile technology. By

understanding teachers' perceptions and views, stakeholders can find ways to assist and improve teachers' adaption to mobile technology. This study highlighted teachers' adaptation to using mobile technology and their experiences in using the devices inside the classroom. By having a positive attitude towards and experience with mobile technology, teachers become encouraged to use the device regularly in order to stimulate learning in the classroom.

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APPENDICES

APPENDIX A

Letter addressed to principals

Faculty of Education

Dear Sir/Madam,

INVITATION FOR YOUR SCHOOL TO PARTICPATE IN A RESEARCH PROJECT: Investigation into mobile technology acceptance in Centurion private schools.

I am currently enrolled for a Master's degree at the University of Pretoria. Part of the requirements for the awarding of this degree is the successful completion of a significant research project in the field of education.

The title of my approved research study is**: Investigation into mobile technology acceptance in Centurion private schools.**

This study is concerned with investigating how teachers and the school adapt to the use of mobile technology in the classroom and in the school.

You are hereby invited to participate in this research project, which aims to:

- Find out whether learners are permitted to use mobile technology
- Investigate the extent in which learners are permitted to using mobile technology
- Explore the different technology programs that the school adapts to.

Below is the scope and responsibility of your participation. To gather information, I require to approach any primary school teachers who use mobile technology in their teaching. I also require approaching the IT technician of your school who deals with the use of mobile technology around the school. These participants will receive an individual invitation to participate. Those who do agree to participate will be interviewed about certain aspects of the use of mobile technology and how they adapt or adapted in using the mobile device in their

teaching. This interview should take no longer than 60 minutes, and can be conducted at any location the participants suggest. I have included here for your information a schedule of interview questions.

Please understand that the decision for your school to participate is completely voluntary and that permission for your participation will also be protected by the University of Pretoria. Please also note that each individual's participation in the study will be completely voluntarily and will in no way either advantage or disadvantage them. Each participant will be free, at any stage during the process up to and including the stage at which they authenticate the transcript of their interview, to withdraw their consent to participate, in which case their participation will end immediately without any negative consequences. Any and all data collected from them up to that point in the study will then be destroyed.

All the information obtained during the research study will be treated confidentially, with not even the Department of Education having access to the raw data obtained from the interviews. At no time will either your school or any of the individual participants be mentioned by name or indeed be allowed to be identified by any means in the research report.

At the end of the research study you will be provided with a copy of the research report containing both the findings of the study and recommendations. This research study presents a unique opportunity for your school to get involved in the process of research aimed at exploring ways and means to improve the relations at management level in South African schools. If you decide to allow your school's participation, kindly show this by completing the consent form at the end of this letter.

Thanking you in anticipation.

Yours in service of education,

Samu Dvuba	Dr M Mihai
Student Researcher	Supervisor
University of Pretoria	University of Pretoria
sdvuba@gmail.co.za	maryke.mihai@up.ac.za
(081) 396 0086	(082) 430 2928

LETTER OF CONSENT

SCHOOL AS PARTICIPANT

VOLUNTARY PARTICIPATION IN THE RESEARCH PROJECT TITLED:

Investigation into mobile technology acceptance in Centurion private schools.

I, _____, the principal of

_____hereby voluntarily and willingly agree to allow my school to participate in the above-mentioned study introduced and explained to me by Samukelisiwe Dvuba, currently a student enrolled for an MEd degree at the University of Pretoria.

I further declare that I understand, as explained to me by the researcher, the aim, scope, purpose, possible consequences and benefits and methods of collecting information proposed by the researcher, as well as the means by which the researcher will attempt to ensure the confidentiality and integrity of the information she collects.

_____ _____

Full name Signature

_____

Date

School stamp

APPENDIX B

Letter addressed to participants

Faculty of Education

Dear Sir/Madam,

INVITATION TO PARTICPATE IN A RESEARCH PROJECT:

Investigation into mobile technology acceptance in Centurion private schools

I am currently enrolled for a Master's degree at the University of Pretoria. Part of the requirements for the awarding of this degree is the successful completion of a significant research project in the field of education.

The title of my approved research study is: **Investigation into mobile technology acceptance in Centurion private schools.**

This study is concerned with the investigating how teachers and the school adapt to the use of mobile technology in the classroom and in the school.

You are hereby invited your school to participate in this research project, which aims to:

- Find out whether learners are permitted to use mobile technology
- Investigate the extent in which learners are permitted to using mobile technology
- Explore the different technology programmes that the school adapt to.

Below is the scope and responsibility of your participation. To gather the information I require for this research, I request permission to interview you as a primary school teacher about certain aspects of the use of mobile technology and how you adapt or have adapted in using the mobile device in your teaching. This interview should take no longer than 60 minutes, and can be conducted at any location you suggest. I have included here for your information a schedule of interview questions.

Please understand that the decision for you to participate is completely voluntary and that permission for your participation will also be protected by the University of Pretoria. Please also consider that each individual's participation in the study will be completely voluntarily and will in no way either advantage or disadvantage them. Each participant will be free, at any stage during the process up to and including the stage at which they authenticate the transcript of their interview, to withdraw their consent to participate, in which case their participation will end immediately without any negative consequences. Any and all data collected from them up to that point in the study will then be destroyed.

All the information obtained during the research study will be treated confidentially, with not even the Department of Education having access to the raw data obtained from the interviews. At no time will either you as an individual or your school be mentioned by name or indeed be allowed to be identified by any manner or means whatsoever in the research report.

At the end of the research study you will be provided with a copy of the research report containing both the findings of the study and recommendations. This research study presents a unique opportunity for you and your school to get involved in the process of research aimed at exploring ways and means to improve the relations at management level in South African schools. If you decide to participate in this research study, kindly indicate this by completing the consent form at the end of this letter.

Thanking you in anticipation.

Yours in service of education,

S. Dvuba

Student Researcher

University of Pretoria

u12113370@tuks.co.za

(081) 396 0086

Dr M. Mihai

Supervisor

University of Pretoria

maryke.mihai@up.ac.za

(082) 430 2928

LETTER OF CONSENT

INDIVIDUAL PARTICIPANT

VOLUNTARY PARTICIPATION IN THE RESEARCH PROJECT TITLED:

Investigation into mobile technology acceptance in Centurion private schools.

I, _____, hereby voluntarily and willingly agree to participate as an individual in the above-mentioned study introduced and explained to me by Samukelisiwe Dvuba, currently a student enrolled for an MEd degree at the University of Pretoria.

I further declare that I understand, as they were explained to me by the researcher, the aim, scope, purpose, possible consequences and benefits and methods of collecting information proposed by the researcher, as well as the means by which the researcher will attempt to ensure the confidentiality and integrity of the information she collects.

_____ _____

Full name Signature

_____

Date

APPENDIX C

Interview schedule and survey

Background information		
School Name:		
School location (Province & City):		
Age:		
Gender		
Qualifications:		
Subjects you teach:		
Years of experience:		
Any specialised training with regard to ICT's (Information & Communication Technologies):		
Interview questions		
Questions	**Response**	**Own reflective notes**
When was mobile technology first introduced in your school?		
What types of mobile technology devices are used in the classroom?		
Are learners permitted to use mobile technology in class? If yes, to what extent?		

How have you adapted to using mobile technology in your classroom?		
How do you use mobile technology in the classroom?		
Do you think using mobile technology this way benefits teaching and learning? If yes, how has it benefited teaching and learning?		
How often is mobile technology used in the classroom?		
What are the different programs or applications that you use?		
How are these programs or applications being utilised in teaching and learning?		
Does using these programs or applications help with the learning process? How?		
Are there challenges that you face as a teacher in using mobile technology in the classroom? If so, what are the challenges?		
How do these challenges affect your use of technology in your future teaching?		

Are there limitations for learners in using mobile technology?		
Is there training available on using mobile technology? If so, what training?		
Do you think that the training benefits teachers in finding a variety of ways to use technology? How?		
Do you use mobile technology in preparing for lessons? If so, how is it being used?		
What are your perceptions, views or attitudes on using mobile technology in the classroom?		
How did these views or attitudes influence your teaching and learning?		
How useful is it for you to use mobile technology in your teaching? Explain.		
How easy is it for you to use mobile technology in your teaching?		

SURVEY QUESTIONS

Perceived usefulness	Strongly agree	Agree	Neither	Disagree	Strongly disagree
1. Using mobile technology makes it easier to do my job.					
2. Using mobile technology improves my job performance.					
3. Using mobile technology saves me time.					
4. Using mobile technology enables me to accomplish more work than would otherwise be possible.					
Perceived ease of use	Strongly agree	Agree	Neither	Disagree	Strongly disagree
1. My job will be difficult to perform without mobile technology.					
2. Interacting with mobile technology requires a lot of my mental effort.					
3. It is easy for me to remember how to perform tasks using mobile technology.					
4. The learners find it easy to use mobile technology.					