



In-service teachers' integration of instructional technology into curriculum delivery at
primary schools on the Cape Flats

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DECLARATION

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Signed

Date

ABSTRACT

This study explores challenges teachers face when using instructional technology in Cape Flats primary schools and to suggest ways of how these challenges could be mitigated. Instructional technology has permeated the education system in the 21st Century and it is now a norm for it to be used in classrooms for educational purposes. Despite the prevalence of a variety of instructional technology, not all teachers are fully equipped to take advantage of the immense benefits it posits. This study revealed that a lot of teachers in public schools in the Western Cape still face critical challenges in their attempt to fully integrate instructional technology for pedagogy. The study employed a qualitative research design to explore the challenges affecting the integration and use of instructional technology for curriculum delivery by teachers in primary schools in the Cape Flats. The framework underpinning this study is the Technological Pedagogical Content Knowledge (TPACK) framework which guided the researcher in the analysis of the research findings. The researcher used two data collection instruments, namely, semi structured interviews and observations. Face to face semi-structured interviews were conducted with 10 participants and themes were used for analysing data. Participants were fully furnished with information regarding their rights when participating in the study. They were informed that they could withdraw at any given stage during the interview process. Despite the permeance of technology in the education sphere, the study's findings show that teachers in Cape Flats in the Western Cape still experience challenges that militates against effective integration of technology in classrooms for pedagogy. The findings reveal that for effective integration of instructional technology to take place, several factors needed to be critically addressed. They included the lack of training, limited access to instructional technology, lack of technical support, lack of time and the theft of instructional technology resources.

Key words: instructional technology, Integration of instructional technology for pedagogy, less affluent primary schools, curriculum delivery.

DEDICATION

This thesis is dedicated to my parents, Betani Yivani Mdingi and Nomfazwe Mvambi Dzingwe, who raised me and made me believe that education is key to success.

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CHAPTER 1
INTRODUCTION TO THE STUDY

1.1. Introduction

Instructional technology plays an important role in teaching and learning. Researchers such as Omariba (2012) reported numerous benefits when technology is well utilized in the classroom. These benefits are: to improve engagement and arouse learners' interest and make a lesson more fun and enjoyable. According to Omoriba (2012:21) instructional technology is "a combination of including people, materials, machines, facilities as well as purposes and processes that support effective and meaningful facilitation of learning". In this study, instructional technology refers to all technology used by teachers in their classroom for teaching and learning for example laptops, tablets and smartboards

Teachers in developing countries like South Africa are continually being encouraged to integrate instructional technology in their classrooms. These countries are encouraged to find innovative ways to improve curriculum delivery through utilisation of different instructional technology. The driving force behind this stems from the wide range of benefits instructional technology posit like improving curriculum delivery and the quality of education offered (Chigona, 2015). Watson (2015) shares the same view and states that the integration of instructional technology improves curriculum delivery by providing teachers with new ways to address learner needs.

It is therefore imperative that learners are exposed to instructional technology so as to benefit from the advantages that it provides. Instructional technology gives teachers the affordances of connecting the local classroom to global places (Chigona, 2015). Through visual conferencing, English school boards have the opportunity to communicate with people from all around the world (Omariba 2012). In that way, global connections increase and richer learning opportunities are available to students including more collaborative learning opportunities. Using Instructional technology in the classroom, teachers have the opportunity to develop their lesson plans, make it more inquiry-based, project-based or collaborative-based. There is a plethora of technology enhanced opportunities for students to benefit from. These range from

simple browsing of the World Wide Web, to using word processors, presentation tools and professional graphic software (Madoda and Chigona, 2019) .

The South African government initiated programmes like the Khanya project in response to the need for technology integration into teaching. The main aim of the Khanya project was to equip all public schools in the Western Cape with instructional technology (Chigona, 2015). The Khanya project has been training teachers on how to integrate instructional technology in their classes (Chigona, 2018). Literature has however, shown that, Khanya did a good job in equipping schools with technology like computer laboratories and smart boards, but the training offered to teachers was limited; teachers were trained on how to operate the technologies and not how teach with and through them. Consequently, teachers are not able to integrate the technologies into their practice resulting in many technologies becoming white elephants. It is therefore important to understand the challenges teachers are facing when integrating technologies into their classrooms to enable effective use of the instructional technologies in schools in the 21st Century.

The White Paper on Education (White Paper 7, Section 2.23) of the Department of Education (DoE) (2004) set a goal that by 2013 every teacher and learner should be ICT capable. This goal, though commendable, has proven difficult to realise as the deadline of 2013 has passed yet not every teacher and learner are ICT capable (Watson 2015). This boils down to the fact that there is more to integration of instructional technology than merely providing the infrastructure. There is need to understand different facets like teacher beliefs and efficacies regarding what good teaching entails and also the skill to integrate technology, pedagogy and the content to be communicated to learners (Chigona 2015).

According to Stoilescu (2011) the integration of instructional technology is closely associated with teacher beliefs on what is good teaching. Therefore, comprehending the teachers' positions and beliefs on instructional technology is important in understanding the integration of instructional technology in schools. This understanding will aid the achievement of the goals set by the White Paper, that is, to have teachers that are ICT capable.

Furthermore, instructional technology has benefits on learning as it enables learners to become active participants in the teaching and learning process (Chigona, 2015). Instructional technology devices such as Interactive Whiteboards (IWB) create learner-centred teaching (Fu 2013). The above points demonstrate the potential instructional technology has in improving learner performances in classrooms. Against this backdrop, the researcher sought to do this study therefore is to explore challenges teachers faced while integrating instructional technology for teaching and learning and how these challenges were mitigated. The interest stems from the potential that instructional technology has regarding the enhancement of teaching practice and learner performance. Technologically enhanced learning has vast benefits for the learners.

The rest of the chapter is organized into the following subsections:

- 1.1 Significance of the study
- 1.2 Problem statement
- 1.3 The aim of the study
- 1.4 Research questions
- 1.5 The objectives of the study
- 1.6 The assumptions of the study
- 1.7 Explanation of key concepts
- 1.8 Summary of the chapter
- 1.9 Summary of the chapter

1.2. Significance of the study

The Department of Education's Draft White Paper on e-Education (2004) posits that the Department values the integration of instructional technology for curriculum delivery to improve the learners' academic performance. The goal is to prepare learners to be useful members of society that are technologically savvy. As this study highlights, the integration of instructional technology is proving difficult as teachers in Cape Flats primary schools in the Western Cape are not integrating instructional technology effectively in their curriculum delivery. Given the many advantages of instructional technology on learner education (Chigona, 2015), there is need to create an environment that encourages instructional technology integration in public schools where teachers can start integrating instructional technology in their classes. This

position concurs with Nkula and Krauss (2014) who states that despite the numerous opportunities offered by instructional technology there are many schools in South Africa that still experience problems of integration of instructional technology for curriculum delivery.

This study explores challenges faced by in-service teachers while integrating instructional technology for teaching and learning in Cape Flats primary schools in Western cape. These are schools situated in low socio-economic areas and are mostly public schools. Among the challenges they experience are crime and shortage of resources. Initiatives such as the Khanya project were created to specifically target schools in these regions to improve the sub-par education received by learners in these schools.. As noted earlier, the main aim of the Khanya project was to equip schools with instructional technology and train teachers to utilise instructional technology (Chigona, 2015), as a result, students in less affluent areas would receive better quality education. The expectation was that instructional technology would bridge the gap caused by lack of resources. Despite this, the concern is that teachers in Cape Flats primary schools are not integrating instructional technology as had been hoped when the Khanya project was launched. This means that learners from these areas continue to receive sub-par education, thereby limiting their chances of being technologically savvy and useful members of society. The aim of this study was to explore challenges faced by in-service teachers while integrating instructional technology for teaching and learning in schools of the Western Cape. This will go a long way in facilitating their future roles in the economy and society at large.

Instructional technology can play a tremendous role in Cape Flats primary schools. It makes teacher planning simpler, enable content to be presented in various ways; such as videos or games while it also facilitates learner-centered teaching. All these advantages make it a necessity for teachers in under-resourced schools to use instructional technology in their pedagogy. There are studies on the adoption of technology in public schools like that of (Stols et al., 2015). This study contributes to this existing body of knowledge by giving special attention to the Western Cape Province.

The study was designed to gain an understanding on challenges faced by in-service teachers in the integration of instructional technology for pedagogical use in Cape Flats

of the Western Cape Province, South Africa. This was done with the knowledge that teachers received training when the Khanya Project was installing the various instructional technology. This study will help the Department of Education understand why there is such a low uptake of instructional technology for pedagogy in Cape Flats primary schools, and subsequently provide solutions on how that can be addressed.

The Technological Pedagogical Content Knowledge (TPACK) theoretical framework underpins this qualitative research project. The TPACK framework was chosen because it aids teachers to integrate instructional technology in their classrooms (Mishra and Koehler, 2006). Semi-structured interviews and non-participative observations were used as data collection methods.

1.3. Problem statement

The integration of instructional technology in Cape Flats primary schools in the Western Cape has not been without problems. Technology is available in these schools includes computers, laptops, internet, email, Microsoft office suite, overhead projectors, interactive whiteboards and data projectors. These devices are hailed as potential solutions to the sub-par education being received in public schools (Nkula and Krauss ,2014)). It is therefore imperative to investigate why, even after technology has been introduced into these schools, there is been little improvement on the quality of education offered.

This is important for the creation of an environment that ensures quality teaching and learning in the 21st Century. This study is of the view that effective integration of instructional technology in classrooms can improve curriculum delivery and learner performance thereby enabling the goals of the DoE-Draft White Paper on e– Education to be realised. Therefore, it is important to explore challenges teachers face when using instructional technologies in Cape Flats primary schools and to suggest ways of how these challenges could be mitigated.

1.4. The aim of the study

The aim of this study therefore is to explore challenges faced by in-service teachers while integrating instructional technology for teaching and learning. The hope is that

the findings in this study will be used to help with improving integration of instructional technology for pedagogy in classrooms of Cape Flats schools as well as other public schools in disadvantaged communities in the Western Cape and South Africa at large.

1.5. Research questions

It is important to highlight that integrating instructional technology for curriculum delivery improves the teaching and learning process. Chigona (2015) stated that integrating instructional technology allows for the transformation of pedagogy and create new ways to access and process information. Despite the countless opportunities that instructional technology brings to teaching and learning, there is a number of challenges that constrain the effective integration of instructional technology for pedagogical use. Against this background, the following key research question guided this study:

What are the challenges that affect in-service teachers' integration of instructional technology into pedagogy in Cape Flats primary schools in the Western Cape?

Sub-questions

1. What challenges do in-service teachers face when using instructional technology in schools on the Cape Flats?
2. What do teachers perceive as the benefits of using instructional technology for curriculum delivery?

1.6. The objective of the study

The objective of this study that emanate from the aim of the study and the questions posed for the study are:

- To explore the challenges that influence the integration of instructional technology for pedagogy in classrooms of public schools in primary schools.
- To understand challenges that teachers face with regards to integration of instructional technology for pedagogy in their classrooms.
- To provide possible recommendations for primary schools in areas of the cape flats in Western Cape on how to address challenges associated with the integration of instructional technology for pedagogical use

1.7. The assumptions of the study

This study carries the assumption that the availability of instructional technologies does not guarantee the effective use of these instructional technologies.

It is the researchers' belief that for effective curriculum delivery to occur in classrooms there is need for instructional technology to be effectively integrated. This is only fully achievable when the schools are provided with enough support on how to use the instructional technology, and support in case of technical failures.

This study rests on the assumption that there is a lack of knowledge on how to integrate instructional technology among teachers who teach in primary schools located in Cape Flats. This consequently creates a problem when it comes to integrating the technology for teaching in the classrooms. It is vital, therefore, that an ICT committee be formed with qualified personnel to teach teachers on how to effectively use instructional technology and provide support for all technical and related problems, especially in under-resourced and less affluent primary schools.

The researcher believes that lack of financial resources to acquire, maintain and upgrade Cape Flats for pedagogy play a role in constraining teachers' ability to integrate instructional technology for pedagogy in their classrooms. Resource constrained schools cannot afford instructional technology thereby affecting their capacity to upgrade archaic instructional technology. The effect is that educators are discouraged from integrating instructional technology in their classrooms.

1.8. Definition of concepts

In this study the following words have been used for the purpose and with the intention as explained below:

Instruction – Is the purposeful, orderly, controlled sequencing of experiences to reach specific educational goals.

Instructional technology – Complex, integrated process involving people, procedures, ideas, devices and organisation, for analysing problems and evaluating and managing solutions to those problems in situations in which learning is purposive and controlled.

Integration – The adoption, inclusion and use of resource materials / equipment's to aid instruction in the teaching and learning process.

Pedagogy- Is the study or science of ways and methods of teaching.

Preparedness – The readiness, knowledge and skills teachers have in using instructional technologies.

Technology – Is a planned systemic method of working to achieve planned outcomes a process not a product. Technology is the applied side of scientific developing a systematic body of facts and principals related to a comprehensive practical and useful (Nkula and Krauss ,2014).

1.9. Overview of chapters

This section presents a summary of the different chapters that make up this study. The following is a brief narrative of the five chapters.

Chapter 1: Provides the background, aims, objectives and a description of the research question guiding the study. The background has been provided from a general perspective with focus on challenges faced by in-service teachers while integrating instructional technology in Cape Flats schools in the Western Cape. The key concepts used in this study are clearly defined in this chapter.

Chapter 2: Reviews literature on the integration of instructional technology in primary schools. Focus is on explaining how crucial instructional technology is in education, problems faced by teachers in integrating instructional technology for pedagogy and barriers in using instructional technology. The theoretical framework that underpins this study is also explained.

Chapter 3: Discusses the research design and methodology used in this qualitative study. The chapter also justifies the choice of research methods used in this study. Details of sampling procedures, methods of data collection and concerns of trustworthiness, reflexivity and ethical considerations are also clarified in detail.

Chapter 4: Presents the main themes and findings that emerged during analysis. Themes dealing with the integration of instructional technology for pedagogy in Cape Flats primary schools in the Western Cape are explored. The findings are linked with the theoretical framework that guides this study.

Chapter 5: It presents a discussion of the findings to determine challenges faced by in-service teachers when integrating instructional technology for pedagogy in Cape Flats primary schools in the Western Cape.

Chapter 6: Conclusions and Recommendations

1.10. Summary of the chapter

There is evidence that even with the introduction of instructional technology in schools, the integration of it in pedagogy remains poor. There are a number of possibilities why this remains the case. This study therefore sought to explore the challenges experienced by teachers in their practice regarding the integration of this technology. The emphasis of this study was to explore the challenges that affect in-service teachers' integration of instructional technology into pedagogy focusing on primary schools in the low income area of in Cape Flats primary Schools in the Western Cape.

CHAPTER 2
LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Introduction

It was mentioned in the preceding chapter that this study focused on the challenges faced by teachers when integrating technology into their teaching and learning practice. As such, it is vital to review previous studies focusing on integration of instructional technology. This must happen in order to broaden understanding of issues related to the challenges faced by teachers when integrating instructional technology. This chapter, therefore, focuses on reviewing literature that deals in depth with issues regarding the integration of instructional technology for pedagogy in schools.

The literature review was undertaken to find a credible framework that can underpin this study. For optimum Integration of emerging instructional technology or ICTs in classrooms there is a need to reflect on ongoing classroom practices. The TPACK framework is paramount to effective instructional technology integration in classrooms. With various instructional technology constantly permeating our society, many schools have begun integrating the technology into their curriculum delivery due to the potential advantages they present (Tunjera and Chigona,2020). For optimum integration of instructional technology like interactive white boards (IWB) and computers there is a need to understand the challenges faced by teachers that inhibit their integration of various instructional technology in classrooms. As will be shown in this study, TPACK entails a spectrum of pedagogical approaches neatly interwoven with appropriate technological understanding for pedagogy to be executed effectively (Omariba ,2012).

We are now living in an era where our daily lives are intertwined with technology. For instance, internet users have more than doubled in the 5 years between 2016 and 2020 with numbers projected to have moved from 0.974 billion to 1.9 billion (Madoda and Chigona, 2018) Additionally, the rapid social and political changes in many developing economies like South Africa created economies demanding the use of instructional technology for teaching. It is therefore important to understand the challenges faced by teachers when integrating technology into their teaching and learning so that they can be mitigated.

2.2. The meaning of instructional technology

The definitions of instructional technology are many and are ever evolving since the first formal efforts were made to define the field (Seels & Richey, 1994). The focus of some of the first definitions of instructional technology, were on instructional media: “The physical means via which instruction is presented to learners” (Reiser & Dempsey, 2002:7). These early definitions have been traced back to the early part of 20th Century when educational films were first being produced. This led to an increase in the use of visual materials in schools. As advancements in media were being discovered, such as sound recordings, radio broadcasting, and motion pictures with sound and then the popularity and growth of television the shift was made from a visual format to an audio-visual format as a delivery of instruction (Reiser & Dempsey, 2002). Even as the field of instructional technology has evolved to encompass much more than just media, many professionals still focus on the media aspect of instructional technology (Omariba ,2012).

It was during the 60’s & 70’s that a number of leaders within the field of education started discussing instructional technology in a different way. Instead of referring to instructional technology simply as it related to media, they started discussing it as a process (Reiser & Dempsey, 2002). Two of those educational leaders who offered new ways of looking at instructional technology were by Finn (1960) and Lumsdaine (1964). Finn thought instructional technology should be viewed as a way of looking at instructional problems and examining feasible solutions to those problems (Finn, 1960). Lumsdaine indicated that “instruction” could be thought of as an application of science to instructional practices (Lumsdaine, 1964).

In 1970 the Commission on Instructional Technology, defined instructional technology as “a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communications, and employing a combination of human and nonhuman resources to bring about more effective instruction” (Commission on Instructional Technology, 1970:19). This definition exemplifies instructional technology as a changing field with a focus on a systematic process of delivering instruction. Another simple and straight forward definition of the field of instructional technology that also includes the practice of systematic approach is offered by Armsey and Dahl (1973).

They defined Instructional Technology as “the things of learning, the devices and the materials which are used in the processes of learning and teaching” (Armsey & Dahl, 1973, p. vii).

There is no single definition for instructional technology; however, Dahiya (2004), defines it as a world of whirling gears, tools and machinery, assembly line, time clocks, computers and depersonalizations. Singh and Hurley (2017) view them as money, materials and people necessary for the pursuit of some goal. He observes further that they are resources and equipment which include teachers, students, computers, skill models and other people knowledge in a specific subject area from which students might learn. Demir (2018) refers to this instructional technology as teaching aids which must aid the teaching of a topic. Technology is a complex term and has been defined differently across varying contexts. According to Skinner (2016) instructional technologies are machines used for teaching and learning. Seels and Richey (2012) explains that instructional technology is used in classrooms as teaching aids. The term instructional technology refers to audio-visual and related materials that serve instructional functions for education and training according to Alice and No (2012). Koh and Divaharan (2011), refer to instructional technology as contemporary computer software that contains combinations of texts, graphics, animation, audio and video. They further acknowledge that instructional technology refers to several different classes of software that are used to achieve clearly defined educational goals. From these definitions, instructional technology refers to technology that teachers use during teaching and learning.

2.3. The importance of integrating instructional technology in classrooms

Chigona (2017:23) states that teachers need to come “to an understanding that instructional technology has power to both advance innovation and collaboration or mislead and distort, and it is the classroom teacher/facilitator’s responsibility to foster the realization of the power of instructional technology.” The power of instructional technology inside the classroom includes its ability to elevate students’ creativity, innovation and critical thinking as well as developing them into adept researchers and problem solvers (Watson, 2015).

Madoda and Chigona (2018) posit that the widespread technocentric view about the transformative nature of instructional technology has resulted in the introduction of various instructional technology in schools. For them instructional technology is seen as powerful tools for supporting learner centred environments. Concurrently, they provide access to resources that enable the construction of personal meaning by providing interlinks between instructional technology on new and existing knowledge. The provision of such interlinks provides learners with a superior learning environment. According to Brown and Green, (2017) instructional technology's intrinsic ability to transform teaching and learning by increasing learner engagement creates a superior learning environment. When instructional technology is are effectively used learner performance on assessments increases (Watson, 2015)). The innate ability of instructional technology to improve learner performance lies in the fact that it houses facilities like videos and audio's that offer better learning opportunities compared to static media. Instructional technology provides opportunities for lively interactions and inquiries (Kaput & Shaffer, 1999 cited in Stoilescu, 2011). Furthermore, instructional technology has new representational infrastructures that provide openings to reintegrate knowledge previously learnt (Madoda and Chigona ,2018).

Lam and Hassan (2018) argued that instructional technology initiates a means for the development of interaction and dialogue among learners. The two emanate from the inherent nature of instructional technology to create a learner-centred teaching approach. A learner-centred teaching environment allows for the creation of an environment where learners are subjected to working together during activities like group work, and by so doing facilitating dialogue and interaction. Warwick, Mercer, Kershner and Staarman (2010) concurs with the above asserting that instructional technology provides an instrument and environment that encourages dialogue and knowledge construction among learners.

Hall and Higgins (2005) found out that both teachers and learners reported that instructional technology use in education made lessons enjoyable. Consequently, that attribute of instructional technology has led to the proliferation of various instructional technology such as computers and the internet in classrooms around the world (Hsu, 2010). For Somyürek, Atasoy and Özdemir (2009) and Higgins (2003) instructional technology has become widespread because its incorporation in the classroom raises teaching and learning to new levels. Bester and Brand (2013) concur with Somyürek

et al. (2009) and Higgins (2003), arguing that integrating instructional technology encourages learner centred learning and provides teachers with options to develop skills like comprehension and problem solving in their learners.

Watson (2015) is of the opinion that technological features such as photos, sound, animations and video are elements that encourages learners to learn, and enhance teaching by capturing and maintaining learner concentration. Their point is that visual learner's benefit from good visual resources like pictures and videos. In light of this, instructional technology, like Interactive Whiteboards enable lively, exhilarating lessons, drawing on videos and animations from different sources. Chigona (2015), in support of points raised by Watson (2015), stated that instructional technology enables learners to experience real world scenarios. Furthermore, educationalists believe that instructional technology helps students to measure up to challenges in the fast-changing world. An example of this is the learners' need to learn how to think critically and seek information (Tondeur et al., 2008) using various technological devices like computers and the internet. So, with various instructional technology like the Interactive Whiteboard (IWB) and the internet, teachers are finding various ways to make lessons creative and exciting for the learners (Watson, 2015).

Chigona (2015) is of the opinion that integration of instructional technology allows for the transformation of pedagogy. The view is that instructional technology allows for new ways to access and process information. Its flexibility enables learners to work at their own pace. Tondeur et al. (2008) agrees with Chigona (2015) asserting that instructional technology supports constructivist pedagogy and the creation of an environment that empowers learners to take charge of their own learning. Collins and Halverson, (2009), describe a shift where learning has moved from a mere memorisation of information to a situation where learners more readily use critical thinking and different resources to analyse information. In order to assist learners to think critically, instructional technology has been integrated as a resource into the education system. The constant upgrades are made to facilitate continuous improvement of the learning experience. According to Lin, Hsu & Yeh (2011) the innumerable number of instructional technology available to learners allows them to collect and present data easily.

Teachers, therefore, can integrate devices like cell phones that allow for anonymity to check learner understanding and how they reflect on their work. Bray and Tagney (2015:175), when illustrating the importance of utilising various instructional technology like mobile tools, posited that “The use of mobile devices can permit the traditional concept of the classroom to be expanded to include the environment and wider community. Data can be realistic and activities genuinely problem-solving, and the potential for sharing data and the social construction of meaning across multiple contexts open exciting possibilities for collaborative learning. Thus, the use of mobile instructional technology has the potential to have a transformative impact on task design.” Engel and Green (2011) noted that instructional technology like mobile phones, which provide anonymity, can help learners who are usually embarrassed to answer questions for fear of getting answers wrong. Anonymity gives students the confidence to check their understanding by answering questions. Therefore, anonymity allow learners that are typically shy to engage with information and get timeous accurate feedback from the teacher.

Learner performance on assessments increase through effective use of instructional technology. The distinctive ability of instructional technology to improve learner performance is due to the fact that, unlike static media, it houses facilities like videos and audio’s that offer better learning opportunities by providing opportunities for lively interactions and inquiries (Kaput & Shaffer, 1999 cited in Stoilescu, 2011).

2.3.1. The use of instructional technology in teaching and learning

Technology has the potential to make a lesson more interesting and create a more well-rounded experience as the students may find it easier to recognise, comprehend and respond to content learnt (Cho,2017). Darling-Aduana and Heinrich, (2018), note that should teachers want to create more effective learning experiences for their students, they need to have some knowledge about productive learning experiences that can be enhanced with the use of instructional technology. Using technology-inspired teaching materials should create a “cognitive apprenticeship” which should help develop critical thinking, analysis and problem solving.

Laurillard (2013:16) stated that “the more a child has seen and heard, the more he/she wants to see and hear...” This means that instructional technology gives needed

reinforcement to programme instruction. Computers also provide many ways in which a student is rewarded by finding out the level of understanding achieved. Instructional technology widens the range of students experience, assures order and continuity of thought, furthermore it presents the content in a logical, systematically structured manner. This, as a result improves the effectiveness of teaching materials as they provide a sensory rich experience to magnify and reinforce the concepts that have been presented in textbooks (Mentz & Mentz, 2003).

Calik-Uzun and Kul (2019) have described rich text materials such as those combining multimedia as potentially enriching, practical, flexible, fun, powerful, self-paced and time saving. They also believe that when properly used, technology could further critical thinking and independent learning, expand individual exploration, shift some of the learning out of the classroom, expand time for other classroom activities, break the day to day teaching cycle by creating an environment of learning and experimenting. This suggests that countless courses could combine old and new technology and thus create a more effective and dynamic classroom. The successful combination of old and new means, putting together the delivery of class materials and creating rich text materials. "Blending delivery is delivering educational materials in multiple means, including textbooks, online learning management systems, the instructional technology and CD ROM" (Ertmer, 2012:12). Rich text materials are those that combine multimedia such as print, audio, video into one well thought and designed package. With careful consideration, each instructional technology can be used for what it does best (Koh and Divaharan 2011). That is because both blending and creating rich text maximizes the advantages of a technological medium: what it offers, what it provides, what it furnishes and what it invites. For example, paper provides many advantages such as, it is thin, light, porous, opaque and flexible. That means one can write on it, fold it and bind it. Instructional technology also offers multiple rare advantages. It is dynamic, and can manage large amounts of information. That means one can create interactivity and dimensionality and can simultaneously appeal to more senses than paper acknowledges (Skinner 2016).

Langub and lokey-Vega (2017) argue that due to challenges that will arise because of complexities and the need for expert assistance, educators should not be expected to create solutions on their own. This then demands an increase in the number of professional organizations through which teachers can acquire new knowledge in their

respective subject specializations. According to Sarkar (2012) primary schools teaching and learning ICT can be incorporated in Computer Assisted Instruction (CAI) and Computer Managed Instructions (CMI). In addition, the use of instructional technology, electronic mail, the conferencing file transfer and topic searching have provided access to information that covers a variety of topics in research, Science and technology.

In conclusion, as a means of facilitating teaching and learning in schools, instructional technology is not just a means of transforming knowledge, it is an extension of both the teacher and the chalkboard (Schoonenboom, 2014). In this case, the curriculum or the syllabus can apply instructional technology with ease and students can be comfortable with minimal assistance. If well utilized, instructional technology may increase interest and improve comprehension.

2.3.2. Integration of instructional technology in primary schools

Nkula and Krauss (2014) posit that despite the opportunities offered by instructional technology, many schools in developing countries such as South Africa do not have access to it. This means that learners from poor, less affluent areas are losing out on the opportunities offered by the integration of instructional technology in pedagogy. The fortunate few tend to utilise instructional technology in a limited manner by focusing mainly on learning about computers or acquiring ICT skills instead of having technology as an integral part of curriculum delivery (Nkula & Krauss, 2014).

In many developing countries like South Africa, students learn about computers rather than through computers. Consequently, instructional technology is implemented without integration. Implementation with integration is a situation where students utilise instructional technology to learn, with instructional technology as an integral part of curriculum delivery (Nkula & Krauss, 2014). Wilson-Strydom and Thompson (2005) aver that implementation without integration is the acquisition of the technical skills and learning about computers whereas implementation with integration is learning through the use of a computer. There is need therefore to have instructional technology as an integral part of the lessons, where learners use technology devices to learn and help grasp concepts. This has the potential to aid learners improve their performance.

The South African White paper on e-Education observed that the integration of instructional technology in South African schools for curriculum delivery is one of the biggest challenges (Nkula & Krauss, 2014). Generative use of instructional technology, which is the implementation of instructional technology with integration, is not prevalent in South African schools. Many teachers lack the necessary skills required to successfully integrate instructional technology into curriculum delivery. For Unwin (2005), this problem is found right across Africa and in many developing countries. Teachers lack the skills necessary for effective integration of instructional technology for curriculum delivery which results in it often being used on special occasions only. As a result, instructional technology remains an object of curiosity, fear, uncertainty, and mystery rather than an enabling tool (Pelgrum, 2001; Unwin, 2005).

One of the key failures of programmes in African countries is the lack of support for teacher's professional development despite schools being provided with technological devices (Voogt and Tondeur, 2015). It is therefore evident that technological integration is not just about the placement of hardware and/or software. Rather, it encompasses other aspects such as teacher professional development (Tondeur, Cooper, & Newhouse, 2010) and how to utilise it for curriculum delivery.

2.3.3. The availability of instructional technology

Zayed University publicly articulated missions are to lead education in the United Arab Emirates through teaching, learning, research and outreach and to achieve this leadership in a technologically advanced environment (Voogt and Tondeur, 2015). In fulfilling this goal, the university actively promoted instructional technology application among faculty, staff and student's delivery of lessons through advanced technology; use of sophisticated software and information gathering via instructional technology (Moore, 2013). Though the hope was that information technology could add a powerful punch to the modern educational environment, many educators in the United Arab Emirates have found that it is the proper use of available instructional technology rather than the presence of that technology that advances learning (Nkula & Krauss, 2014). Even long-time favourite pencil and paper and the overhead projector still have a place in the well-rounded modern classroom (Omariba, 2012), it comes down to how are they being implemented for effective teaching and learning. Instructional technology

whether old or new, each technology has the potential to enhance teaching and learning (Omariba, 2012).

Sivathaasan (2013) carried out a study on the use of library resources in Nigeria. The study revealed that there was an acute shortage of print and audio-visual materials in most schools. For instance, Sarkar (2012) did a study on the impact of ICT revolution throughout the world which cannot be ignored, where he cites that most countries have become computer literate. He cites India as the country with the largest scientific management in the world whereby the country is able to provide computer education through television and via instructional technology. Australia also prioritizes ICT education according to Omwenga (2012) Malaysia is another country which gives priority to ICT education. The government grants a tax exemption on import of multi-media equivalent as incentive to one of its ICT city referred as cyber Taya. Albugarni and Ahmed (2015) report, incorporating ICT into the educational curriculum has been promoted as a key step in bridging the digital divide in South African schools in recent years. Mayisela (2013) has argued that in South Africa like most developing countries, ICT usage is still limited to using computer. This study is relevant as the selected school was provided with technological equipment by the WCED, hence the researcher intends to investigate teachers' challenges faced while integrating technology into their teaching and learning.

2.3.4. Adoption and use of instructional technology

Davies, Dean and Ball (2013) note that if teachers want to search for more effective learning experiences for their students, they need to have some general ideas about productive learning experiences that integrating instructional technology enhances. Omwenga (2012) observes that while many teachers complain about lack of instructional resources, they are guilty of not using what is available. This current researcher sought to find out why these teachers are not adopting and using what is available in their schools. Kim, Kim, Lee, Spector and DeMeester (2013) further revealed that print media was commonly used in teaching without being mediated. The above studies have not investigated why teacher's do not use the available instructional technology or the challenges facing these teachers and students in the use of instructional technologies. The study sought to investigate the challenges faced by teachers in the use of instructional technologies particularly in the Cape Flats

schools in the Western Cape, South Africa. According to Reiser and Dempsey (2012), instructional technology goes beyond any particular medium or device. In this sense, it is more than the sum of its parts. It is a systematic way of designing, carrying out and evaluating the total process of learning and teaching in terms of specific objectives.

They further explain that, for improvement of instruction and learning, systematic planning, wise and skilful use of the products of instructional technology are basic teachers repeatedly complain of inability to cover the syllabus in time and adequately prepare students for the south African National Examinations; the use of instructional technology can help them reduce the length of time for instruction as most instructional technology can assist in presenting and sifting through large amounts of content (Omariba, Ndichu Gitau & Ayot, 2016). The use of instructional technologies for teaching is a principle role for any person who teaches learners (Laurillard, 2013).

2.4. Teacher attitudes and beliefs on the integration of instructional technology (Internal Barriers)

In order to have full instructional technology Integration in schools it is important to understand teachers' attitudes and implement teacher support programmes (Buabeng-Andoh, 2012). Buabeng-Andoh argued that a teacher's openness to integrate instructional technology is largely based on his/her attitude towards instructional technology and its usefulness. These sentiments are largely shared by many researchers such as Polly and Hannifin (2010) who posit that as we aim to increase instructional technology integration in teaching, it is important to consider the teachers' role. They are of the opinion that a teacher's attitude plays a determining role in the integration of instructional technology in the class.

Empirical studies show that educational belief has an impact on the regularity at which a teacher uses instructional technology in their classroom (Tondeur et al., 2008). Tondeur et al., (2008) state that a teacher's attitude toward integration of instructional technology is related to his/her experience with different instructional technology like computers. Neyland (2011) affirms that teachers' attitude towards instructional technology has a bearing on their integration of instructional technology. This concurs with Tondeur et al. (2008) who posited that a teacher's attitude towards instructional technology influences their integration of instructional technology. For Buabeng-Andoh

(2012), if teachers do not perceive instructional technology to be useful to curriculum delivery, they will not integrate it into their classrooms. Thus, it is important for teachers to have a positive attitude towards the use of instructional technology if there is to be a huge uptake of instructional technology integration in schools.

Chigona and Chigona (2010) are of the opinion that some teachers do not integrate instructional technology in their classes because they are computer-phobic. They further noted that some of the reasons why teachers do not integrate instructional technology are psychological. An example of this is having a feeling that one may damage a computer. Buabeng-Andoh (2012) extends this point, stating that teachers in Portugal said that it was the absence of fear of damaging ICT and their ability to have absolute control over computers that encouraged them to integrate instructional technology in their classrooms. If teachers are afraid of breaking computers, they will not integrate the technology. This means that fear in the affected teachers must be dealt with to avoid installing instructional technology and training of teachers without results.

According to Leendertz (2013) the role instructional technology plays in a classroom is strongly linked with teachers' belief on the nature of teaching and learning. Buabeng-Andoh (2012) supported this stating that teacher belief with regards to the nature of education, dictates if and how instructional technology will be integrated into the classroom. Leendertz (2013) argued that to fully understand instructional technology integration, teachers' pedagogical beliefs should be taken into account. Marcinkiewicz (1993) concurs with this, positing that there is a need to study teachers and understand what makes them integrate technology, if we are to get full instructional technology integration. In addition, Leendertz (2013) points out that teachers who hold constructivist beliefs on teaching integrate instructional technology more readily than teachers who hold teacher-centered beliefs. Furthermore, he argued that teachers who hold constructivist beliefs use instructional technology in a learner-centered way that encourages students to develop higher-order thinking and problem-solving skills.

2.4.1. Teacher self- efficacy

Teacher self-efficacy was an influencing factor in the integration of instructional technology. Buabeng-Andoh (2012) stated that a teacher's self-efficacy has been

reported to have a great influence on the integration of instructional technology. Bandura (1997) defined self-efficacy as one's confidence to perform an activity in order to attain a task. Thus, instructional technology self-efficacy can be defined as a teacher's confidence in using instructional technology. Leendertz (2013) agrees with this point stating that lack of confidence is a barrier to instructional technology integration in classrooms.

Chigona (2015) agrees with Tondeur et al. (2008), Buabeng-Andoh (2012) and Leendertz (2013), arguing that teacher efficacy influences whether teachers integrate instructional technology in their classes. She further adds that teacher confidence influences teachers' technological efficacy. Chigona concludes that if a teacher was never trained to use instructional technology it would impact their teaching, and subsequently generates low self-efficacy to integrate instructional technology into the classroom. A teacher with a positive self-efficacy will feel confident enough to be innovative and creative in the classroom (Chigona, 2015). Therefore, boosting the confidence of teachers will result in the teachers becoming enthusiastic and more interested towards embracing instructional technology in curriculum delivery (Leendertz, 2013).

2.4.2. Gender

Gender has been noted as an influencer on the integration of instructional technology, with males proving more prone to integrate instructional technology as opposed to their female counterparts (Tondeur et al., 2008). Buabeng-Andoh (2012) shares the same view, asserting that there are few studies that show that female teachers integrate instructional technology at low levels as compared to their male counterparts due to factors like limited instructional technology access and limited interest. On the contrary, Breisser (2006)'s findings observed that female perceptions on the usefulness of instructional technology had improved while male perceptions had remained unchanged. This trend was confirmed by Yukselturk and Bulut (2009) who noted more females using instructional technology like the internet at a more frequent rate compared to their male counterparts.

2.4.3. External barriers to the integration of instructional technology for pedagogy.

In developing countries like South Africa, external factors play a big role in determining the integration of instructional technology for pedagogy. External factors such as unreliable electricity supply and time constraints are affecting teachers' integration of instructional technology. The lack of time to prepare for lessons that include the use of instructional technology is another factor (Stols et al., 2015). Other external factors include the absence of support from the schools when it comes to matters that deal with integrating instructional technology in the classroom (Neyland, 2011). Against this backdrop Buabeng-Andoh (2012) argued that in order to have successful integration of instructional technology, institutions must have strong school programs that offer support to teachers. External barriers will be listed and discussed in more detail below.

2.4.3.1. Teacher training

Teacher beliefs on the usefulness of instructional technology may be formed during teacher training, and as such Baylor and Ritchie (2002) aver that ICT training influences the integration of instructional technology in the classroom. For Casey (2010), teachers are not integrating instructional technology in their classes because they believe they were not adequately trained. Felicetti (2011:2) added that the experience of teachers with instructional technology as learners shape how the teachers will integrate instructional technology once qualified as teachers.

In their study on ICT integration in Western Cape schools, Chigona and Chigona (2010) noted that few teachers were incorporating instructional technology in their classes despite having received training through the Khanya project. They observed that teachers were still uncomfortable utilising instructional technology in their classes, signifying that the training they received was inadequate. This concurs with the findings of Casey (2010) and Felicetti (2011, 2) who argued that teachers are not integrating instructional technology in their classes because they feel inadequately trained.

2.4.3.2. Technical Support

Chigona and Chigona (2010) also discovered that teachers who were supposed to be using instructional technology did not have enough technical support to help them in their integration. When teachers needed technical help, the technicians were not readily available leaving teachers without immediate technical support they could rely on (Chigona 2017). This affected teacher's enthusiasm in integrating instructional technology. Hayes (2005) argued that there was need for principals to provide support to teachers by putting measures for professional development in place. He continues to state that it is important to offer support to teachers, and to also have structures such as ICT plans and ICT training (Hayes, 2005).

2.4.3.3. Teaching experience

The amount of time a teacher has been teaching was found to influence instructional technology integration. According to the U.S National Centre for Education Statistics (2000), teachers who have taught for about 3 years used computers 48% of the time compared to teachers with between 4- and 9-years' experience who used computers 45% of the time. Additionally, teachers who had more than 10 years teaching experience utilised computers 47% of their time with those with more than 20 years' experience utilising computers 33% of the time (U.S National Centre for Education Statistics, 2000). A possible reason for this trend could be that newly qualified teachers are more acquainted with the use of instructional technology.

The findings of Buabeng-Andoh (2012 citing Lau & Sim, 2008), in their study in Malaysia contradict those of the U.S National Centre for Education Statistics (2000). Their findings showed that younger teachers were integrating instructional technology less compared to their experienced counterparts. The reason provided to explain this phenomenon was that older teachers have more experience with curriculum delivery and classroom management, and over time become competent with integrating instructional technology. Chigona (2015) is of the opinion that while new qualified teachers are expected to integrate instructional technology anecdotal evidence shows that not many are incorporating instructional technology into their classes due to poor training from their teacher education programmes. This then means that teachers are

qualifying without the specialised skill needed to incorporate instructional technology into their classrooms.

2.4.3.4. Possible solutions to barriers of integrating instructional technology in less affluent schools

Dexter, Anderson and Becker (1999) claim that there has to be an agreement at various levels for the successful integration of instructional technology to happen. The different levels are described by Balanskat, Blamire and Kefala (2006) as teacher-level, school-level and system-level. It is imperative that educators share similar values as the school policy on the integration of instructional technology in the class (Kennewell, Parkinson, & Tanner, 2000). Otto and Albion (2002) agree with the aforementioned authors stating that it is important to have a shared vision on how instructional technology should be integrated. An assessment and evaluation approach is needed for the instructional technology integration plan to be developed, clearly showing how the instructional technology will be used (Kennewell et al., 2000).

Tondeur et al. (2016) suggested that schools with structures like policy planning, instructional technology support and peer support have a positive effect towards teachers integrating instructional technology in their classrooms. In agreement, Hayes (2005) found that the involvement of the principal helps to encourage teachers to integrate instructional technology in their classes, more so, when the integration process is closely related to the school's vision for learning. The expectation is that the principal provides support to teachers by putting in place measures for professional development (Hayes, 2005). Tondeur et al. (2016) added to this saying that peer support reinforces teacher beliefs and the sharing of ideas among them regarding how to use instructional technology to support student-centred teaching.

It is interesting to note that learners' negative attitudes and poor technological skills deter student-centred instructional technology integration (Tondeur, et al., 2016). Chigona (2015:244) argued that "even though most of teacher education learners have the technical skills to operate instructional technology, they still lack the technological pedagogical content knowledge which is necessary for one to be able to appropriate ICTs into curriculum delivery." Empirical data confirms that educators lack information (TPACK) on how to integrate instructional technology in their classrooms for curriculum

delivery (Koehler, Mishra, Akcaoglu, & Rosenberg, 2013). To increase instructional technology integration into the classroom, adequate professional development is required (Glazer, Hannifin & Song, 2005).

2.4.3.5. WCED technology integration initiative

Many ICT related projects have been initiated in South Africa. The initiatives are meant to ensure that schools gain access to technology. For this study we will focus mainly on the Khanya project as it was initiated specifically for instructional technology at public schools in the Western Cape. The Khanya project was established in April 2001, and had the following objectives:

- Increase educator capacity and effectiveness by means of technology;
- Harness the power of technology to deliver the curriculum,
- Enhance the quality of the learning experience in the classroom, providing an opportunity for students to benefit from an instructional technology of learning styles;
- Integrate appropriate and available technology into the curriculum delivery process as different technologies mature;
- Use technology to assist all disabled students to maximise learning;
- Improve Senior Certificate and instructional technology results, as well as student outcomes in all grades, in terms of number of passes and quality of results;
- Increase the number of students qualified and competent to enter tertiary education institutions after obtaining their Senior Certificates and instructional technology; and
- Improve numeracy and literacy in lower grades in order to build a stronger foundation for future matriculants” (Draper: 2010: 17).

The Khanya project primarily had two developmental stages. Early stages of the Khanya project involved “establishing a dedicated space, room, or lab where the technology was installed with the educational software, instructional technology connectivity and security, while the second phase focused on the educational use of the technologies, and included training of educators in the use of ICTs” (Isaacs, 2007:22). The Khanya project has achieved a lot in promoting the adoption and use of ICTs in schools as evidenced by numerous awards received for its successful achievements (Isaacs, 2007). Draper (2010) also claims that because of the initiatives

of the Khanya project almost one thousand schools within the Western Cape Province have access to ICTs and teachers who were trained to use it.

2.5. The instructional technological framework

The TPACK model developed by Mishra and Koehler (2006) explains knowledge that teachers need to effectively teach with technology. According to these authors, for teachers to teach effectively with technology, they must be able to blend technology, pedagogy and content knowledge. The blend of these three knowledge domains is known as TPACK. TPACK is represented as follows:

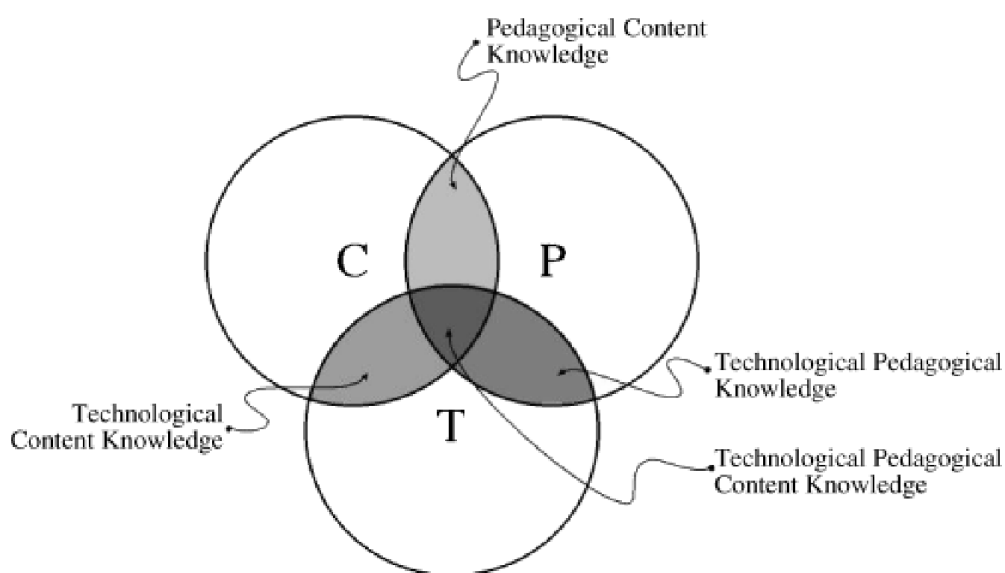


Figure 2.1: TPACK model (Mishra & Koehler, 2006:1025)

In this diagram, C is for content knowledge. Content knowledge refers to subject matter that a teacher teaches in his/her classroom. Pedagogical knowledge (P) refers to how a teacher enacts the curriculum to achieve lesson outcome(s). Technology knowledge (T), is teacher's expertise of using technology in the classroom. Pedagogical Content Knowledge (PCK) is "... the ability of a teacher to know what teaching approaches fit a content and also knowing how elements of the content can be arranged for technology understanding of learners" (Mishra & Koehler, 2006:1027). Technology Content Knowledge (TCK) is the subject matter that teachers teach using technology. For example, teachers can use software programmes to teach Maths. Technology Pedagogical Content Knowledge (TPACK) is pedagogical activities teachers incorporate in their teaching of subject matter with technology. For example, teachers

could divide learners into groups to do technology activities. The intersection of C, P, T is TPACK, meaning TPACK is the integration of instructional technology, pedagogy and content.

The TPACK framework concepts which are TK, CK, TP, PCK, TPK, TCK, TPACK, assisted the researcher to develop data collection instruments and analyse data on challenges teachers faced while integrating technology into their teaching. Though the researcher focused on the TK, CK, TP, PCK, TPK, TCK, TPACK challenges during interviews and classroom observations, he remained open to new challenges that are not linked to the instructional technological framework.

It is imperative that a teacher knows that instructional technology will change how classes are normally taught. The question is whether this knowledge affects integration in any way. If a teacher is not well versed on how instructional technology can shape pedagogy does this cause them to opt not to use instructional technology? If this is the case, this study will give potential solutions to this problem.

Schmidt, Baran, Thompson, Mishra, Koehler, and Shin (2009:125) aver that TPACK “refers to the knowledge required by the teacher for integrating instructional technology into their teaching in any content area. Teachers have an intuitive understanding of the complex interplay between the three basic components of knowledge (CK, PK, TK) by teaching content using appropriate pedagogical methods and instructional technology.” Mishra and Koehler (2006) argue that TPACK consists of knowledge of content, pedagogy, and technology. They further state that it involves an understanding of the complex interaction between these components. In addition, they say that teachers who are in possession of this type of understanding are creative and adaptive in ways which they navigate interactions within TPACK framework. Koehler and Mishra (2009) state that the solution of integrating instructional technology into teaching, lies in the capability of a teacher to navigate the three elements of content, pedagogy, and instructional technology, and the complex connections among these elements in specific contexts. Table 2.1 below explains each of the 7 constructs of the TPACK framework.

Table 2.1: Seven constructs of the TPACK framework

Knowledge constructs	Definitions
Content knowledge (CK)	knowledge about the subject matter
Technological knowledge (TK)	knowledge about instructional technology
Pedagogical knowledge (PK)	knowledge about the process or methods of instruction
Technological content knowledge (TCK)	knowledge to represent the content or the subject matter with instructional technology
Technological pedagogical knowledge (TPK)	knowledge of the existence, components, and capabilities of various instructional technology to be used in teaching
Pedagogical content knowledge (PCK)	knowledge of pedagogical strategies to teach specific content (subject matter)
Technological pedagogical content knowledge (TPACK)	knowledge of using instructional technology to teach and represent the subject matter

Source: Chai, Koh & Tsai (2011)

A teacher possessing TPACK is regarded as one who has understood all the intricate interconnections of (CK, PK, and TK). This teacher should not have a problem determining when to use Instructional technology, and which pedagogical method suits a specific subject matter coupled with the appropriate Instructional technology. This is because TPACK provides the basis of true technological integration and it is expected that possession of this skill means a teacher has enough arsenal to make decisions regarding how and when to properly integrate Instructional technology in the classroom. In relation to this study, it was vital to identify whether teachers have TPACK or not, to determine if measures must be in place to improve TPACK amongst teachers. It was important to further interrogate if possession of this skill automatically means that teachers will integrate Instructional technology into their classrooms, or if a lack of this knowledge automatically means teachers will not integrate these Instructional technologies.

After careful consideration, Technological Pedagogical Content Knowledge (TPACK) was deemed as the suitable framework to underpin this study. It was chosen because it involves an understanding of the intricate connections between the use of Instructional technology in the classroom and pedagogical content knowledge (Mishra & Koehler, 2006). TPACK is a framework that aims to guide teachers on how best to

go about integrating instructional technology in their classrooms. As such, TPACK provides the best guidelines of what skills teachers must have to achieve successful integration. Thus, it is of interest to note whether possession of this skill has any influence on the ability and willingness of teachers to integrate instructional technology in classrooms.

The TPACK framework has its weaknesses, though. According to Graham (2011), TPACK lacks theoretical development. It was founded on Shulman's (1987) Pedagogical Content Knowledge (PCK) framework, a framework that in itself lacks theoretical clarity (Mishra & Koehler, 2006). The framework inherently possesses a high degree of parsimony. The TPACK framework is over-simplified, and does not take into consideration factors beyond content, pedagogy, and technology, such as teacher beliefs and context. The framework also comprises of different classifications that do not have precise definitions. Nkula & Rauss (2014) aver that there are 13 distinct definitions for TCK, 10 definitions for TPK, and 89 for TPACK. Despite all these shortcomings, TPACK is still a powerful framework that provides insight on the skills that teachers need for integration.

2.6. Summary of chapter

In this chapter we have dealt with several issues relating to the integration of instructional technology for pedagogy by teachers. These issues provide direction to the research designs and research instructional technology. The literature listed the different issues that are affecting the integration of instructional technology in our schools, focusing on both internal and external factors, as well as potential solution that have been suggested for these in literature. The chapter also addressed the immense advantages that instructional technology posits if effectively utilised for curriculum delivery. The researcher shall explore the challenges faced by in-service teachers when using technology. This will be done with the aim of providing recommendations to the WCED, the principals and teachers who have access to some level of instructional technology in a primary school in the Cape Flats.

CHAPTER 3
RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

This qualitative study follows an interpretive paradigm and phenomenological design in order to determine the challenges faced by in-service teachers when using technology in a primary school in the Cape Flats. The TPACK model underpins this study as its framework. Qualitative research is used to attain a comprehensive understanding of participants' behaviour, experiences and motivations (Schurink, Fouche & DeVos, 2011). Denzin and Lincoln (2011) stated that a qualitative research approach aims to attain the participants' understanding of their world in their ordinary environment. The reason the researcher chose qualitative research was because of the advantages that it holds. The approach allows the investigator to get complete data and contributes detailed explanations of the problems under study (Denzin & Lincoln, 2011). In addition, it encourages participant individual opinions to be reflected which adds to the richness of data (Denzin & Lincoln, 2011). However, its shortcomings include the time it takes in order to get valid and reliable results (Huberman, Mathew and Miles, 1994). This emanates from the fact that several research methods can be used in one study. Consequently, it takes longer to go through the process of analysing and coding of data (Huberman et al., 1994).

This study is concerned with understanding each individual participant's knowledge of the different instructional technology and their opinions on its integration in the classrooms. Participants' views and opinions are construed through their experiences with instructional technology integration. The phenomenology design was opted for in this study. Phenomenology design involves investigating how the situation was experienced, and the meaning subsequently attached (McMillan & Schumacher, 2006). The design is appropriate as its prominence is on the participant's subjectivity as they integrate technology integration. Thus, the experiences of teachers with technology integration are pivotal to this study. An interpretive paradigm was used as it gives the context of the phenomenon being studied (Reeves & Hedberg, 2003).

Cohen, Manion and Morrison (2011:116) posit the following: "An interpretive paradigm rests, in part, on a subjective, interactionist, socially constructed ontology and on an

epistemology that recognized multiple realities, agentic behaviours and the importance of understanding a situation through the eyes of the participants". The interpretative paradigm gives each participant's view of the reality being studied. It is used with an understanding that everyone sees the world from a different perspective, meaning it is improbable to find universal truths (Walliman, 2011). Greene (1994:536) posits that an interpretive study is "unabashedly and unapologetically subjectivist". Interpretation allows for the elaboration of existing ideas and additionally the formation of new ideas surrounding a particular idea (Altheide & Johnson, 2011). This in particular is relevant to this thesis, especially considering the problematisation of an existing, theoretical framework, i.e. "TPACK" (Mishra & Koehler, 2006). To address the problems of subjective qualitative research methods such as using transparent processes like member checking of transcripts and triangulation are used.

3.2. Research design

A qualitative approach is used within a case study design in order to determine the challenges faced by in-service teachers when using technology in a primary school in the Cape Flats. McMillan and Schumacher (2001:428) define qualitative research as:

"interactive face-to-face research, which requires relatively extensive time to systematically observe, interview and record processes as they occur naturally".

The qualitative design is appropriate for the study as it serves to provide deeper insight into challenges faced by teachers while using technology and how these challenges were mitigated. The researcher collected first-hand data from teachers by interviewing them on their perspective of challenges they faced while using instructional technology. The information collected is corroborated with classroom observations.

According to Leedy and Ormrod (2005) a case study is a method that allows for in-depth data collection during the utterances of participants for a defined period in obtaining the data first-hand. Furthermore, McMillan and Schumacher (2001) state that, qualitative research uses a case study design and this means that the data analysis focuses on one phenomenon which the researcher selects to understand in-depth, regardless of the number of sites or participants for the study. In this study, the

researcher collected in-depth data using different methods (interviews and observations) during data collection. In addition, interviews allowed the researcher to probe for in-depth information.

3.2.1. Site selection

Kombo and Tromp (2006) aver population as a group of items, objects or people from which samples are considered for measurement. Strydom and Delport (2011:223-224) coined that population refers to people that have certain features that the researcher is interested in. The population of the study was teachers in urban area in the township of Samora Machel in Philippi, in the Cape Flats schools. There was specific attention given to teachers in these primary schools. This research was conducted in 2 public primary schools were selected from the Metro South districts of the Western Cape Province. The researcher chose these two schools because they had received instructional technology via the Khanya project. This district was chosen because of its close proximity to the researcher's residence making it cost effective while still providing valuable data. The two primary schools were selected using a simple random sampling technique in order to reduce the chances of researcher bias. To accomplish this sampling the researcher obtained a list of public schools within the Metro south district of the Western Cape. Names were written on a piece of paper and the researcher picked two names from the container at random. Any of the identified schools had the same probability of being chosen throughout the sampling process (Thompson, 2012). The names of the two schools were anonymised and substituted with alphabetic pointers to promote confidentiality. The researcher chose these two schools because they had received instructional technology via the Khanya project. This means these schools had technological resources making them suitable sites to conduct this study

3.2.2. Participant Sampling

Sampling is a procedure whereby participants from whom information is gathered are selected. Sampling helps the researcher to decide how best to get the best solutions to the problem (Dzansi & Amedzo, 2014). Walliman (2011) asserts that a sample is a carefully chosen number of cases in a population. He further continues to say that sampling must be undertaken whenever a researcher can gather information only from

a fraction of a population (Walliman, 2011). Random sampling was used to choose the schools where the data was collected. The names of all public schools were put into a hat, and the researcher just picked up names of the two schools he would carry out the research at without looking. The schools were randomly chosen, and every school had a chance of being chosen. This study had a total of 10 participants. These 10 participants volunteer to be part of the study hence the sampling is purposive. The researcher used all 10 teachers who voluntarily accepted to be part of this study.

The reason of choosing teachers was because improving learner's performance is one of the core mandates of the executive summary of the National Development Plan (NDP) (Stols, et al., 2015). These teachers were purposively selected because during the implementation of the Khanya Project all teachers from the two schools were part of the group targeted in the rollout of the project. "Purposive sampling targets individuals who are 'typical' of the population being studied" (Davies, 2007:57). Maree (2007) argues that purposive sampling is when participants in a research are chosen because of some defining characteristic. Walliman (2011:188) stated that purposive sampling is "where a researcher selects what he thinks is a 'typical' sample."

The sample size of the study was determined by factors such as the budget, time and resources needed to carry out a meaningful research. Time was of essence because the researcher had to source the sample, get their consent and collect data, which is a strenuous procedure. Budgetary constraints also influenced the decision on the sample size. The researcher had limited resources at his disposal. While a large sample could result in vast amount of valuable data being collected, it may require a team of researchers to collect such data entailing more expenses the researcher could not afford. The chosen sample size was reasonable and manageable in line with the available budget, time, and resources.

3.2.2.1. Biographical information of participants

The demographic information of the educators that participated in the study is listed in Table 3.1 below. Table 3.1 includes information such as the gender of the participants, years of teaching experience and racial group.

Table 3.1: Demographic features of the participants

Pseudonym	Years of experience	Years of experience	Racial group
Teacher A	2 yrs	Female	Coloured
Teacher B	38 yrs	Male	Coloured
Teacher C	10 months	Male	Coloured
Teacher D	5 months	Male	Black
Teacher E	17 yrs	Female	Coloured
Teacher F	30 yrs	Male	Coloured
Teacher G	15 yrs	Male	Coloured
Teacher H	7 yrs	Male	Black
Teacher I	21 yrs	Female	Coloured
Teacher J	15 yrs.	Female	Black

Table 3.1, above, shows that the educators who participated in this study had a wide range of experience among them. The teaching experience ranged from as little as 5 months to 30 years of teaching. Such a wide spectrum allows for a more realistic representation of teachers from different eras.

Most of the teachers in the two schools were predominantly male. Male teachers accounted for over 60% of the teachers in this study. Table 3.1 above also shows that over 75% of the educators were coloured. This is likely a product of the location of the schools. Statistics South Africa (2011) posits that 48.8% of the Western Cape population is coloured, 32.7% black, 15.7% white and 1% Asian. This distribution may explain the racial distribution amongst the teachers at the schools.

3.3. Data collection

According to Wellman et al. (2005) one requirement a researcher has to meet is to map out the route of investigation planned and followed in the process of data collection. Data collection begins in the field, during which the researcher establishes rapport with the targeted respondents. In gathering data, the researcher made use of the following techniques which are: Semi-structured interviews and classroom observation schedules. These two instruments are discussed in the subsequent sections.

3.3.1. Semi-structured interviews

According to Walliman (2011) interviews can be carried out in different situations like home, work or the outdoors. He further goes on to say that interviews can be conducted face to face or telephonically. Interviews can be once-off, longitudinal studies or repeated over a period of time to track development (Walliman, 2011). Maree (2007) argues that an interview is a two-way conversation between the interviewer asking the participant questions. He further argues that interviews are done in order to collect data about the participant's ideas, views or opinions. Creswell (2009) purports the following characteristics of interviews, namely — individual indepth, exploratory, semi-structured or unstructured.

The researcher opted for a semi-structured interview, primarily because it allowed the researcher to probe deeper and leave time for further development of answers given. At the same time, participants provided defined answers to defined questions (Walliman, 2011). The researcher ensured that interviews were not side-tracked by trivial aspects that are not related to the study (Maree, 2007). Selecting semi-structured interviews allowed the researcher to modify questions at the researcher's discretion depending on the response from the participants. During interviews the researcher aimed to collect information, teachers were questioned on their technology, pedagogical and content challenges they encountered while integrating technology in their classrooms and their general views on the role of instructional technology in classrooms.

Interviews were guided by the seven constructs of the TPACK framework (Mishra & Koehler, 2006). Each question that the researcher asked was guided by the TPACK framework. These questions were asked in such a way that the researcher would establish whether the teacher was in possession of technological knowledge or pedagogical knowledge.

During interviews the researcher listened and wrote down what the participants said. The participants expressed themselves fully with the researcher only speaking when seeking clarity or when probing for more information. With permission from the participants, interviews were recorded alongside field notes. The researcher obtained permission from the principal, teachers, WCED and the universities ethics committee

to conduct these interviews and observations. Each teacher was interviewed to get their opinion on challenges they encountered while integrating instructional technology in their schools.

The interviews lasted around 50 minutes each. They were recorded digitally and transcribed verbatim later.

The teachers were asked about their reasons for using instructional technology, and if they did not use it, reasons for not doing so. The teachers were also asked to clarify if they felt instructional technology had any advantages. This was used to see each teacher's perception of the usefulness of instructional technology in teaching and learning.

Barbour (2008) states that interviews allow the interviewees to respond to research questions freely using their own words resulting in a free flow of new ideas. Semi-structured interviews were chosen as it enables the researcher not to derail, but focus on questions on the interview schedule, that aid in answering the research questions. However, the researcher probed for more information in order to obtain in-depth data

3.3.2. Observations

“An observation is the systematic process of recording the behavioural patterns of participants, objects and occurrence without necessarily questioning or communicating with them” (Maree, 2007:83-84). The researcher was a nonparticipant observer. This means the researcher merely observed lessons and did not interact with the class in any way (Davies, 2007). Advantages of being a nonparticipant observer are that it is the least obtrusive form of observation (Maree, 2007). The objective of this exercise was to see how teachers teach with the aid of instructional technology and to ascertain whether the inclusion of instructional technology helped improve pedagogy or student engagement. The researcher chose to be a non-participative observer to avoid influencing the events in the classroom. He wanted the lesson to take place without any disturbance. By being a non-participative observer, the data collected was not subject to bias as events would be taking place as they would on any day. Persistent observations are utilised in order to identify traits relevant to the study and answer the questions posed in this study and to identify those not relevant so they can be

eliminated for analysis purposes. This gives the researcher ample time to observe more traits relevant to the study (Lincoln & Guba, 1985)

3.3.2.1. Reasons for choosing observations

Observations allowed the researcher to gain first-hand experience on how teachers are integrating instructional technology. The researcher observed how teachers integrated various technology into their classrooms. Observations were only undertaken in cases where the teacher taught with technology, or when the teacher decided that the topic, they were currently teaching needed technology to be integrated (TPK). Thus, interviews were the primary technique for data collection. Observations were utilised whenever a suitable opportunity presented itself. Their lessons were also observed in order to identify if they possessed TPACK, and to ascertain how the teachers' TPACK affect their integration of technology and pedagogy.

Observations allowed the researcher to gain first-hand experience on challenges they encountered while integrating technology in their classrooms. And, the researcher observed how teachers integrated various technology into their classrooms.

Observations enabled the researcher to observe the extent to which non-academic challenges affected the integration of technology in their classrooms. Of more importance was the ability for the researcher to perceive information that could have been missed out during interviews. Observations were central to this study. They were used to ascertain the complex relationship of teachers and their decision to integrate instructional technology for pedagogy. Observation, however, has a disadvantage as data collected is subject to bias. To minimize bias, the researcher developed an observation schedule together with a detailed description of what the researcher had to look for during observation in the classroom.

3.3.2.2. Observation procedure

The researcher sat in the classroom observing the proceedings of the lesson and did not participate in classroom activities (Walliman, 2011:195). The teachers explained my presence to the learners in the classrooms, and this encouraged learners to act naturally during the period of my observation. During the observation period the

researcher was writing down notes on an observation schedule (Appendix B). The researcher noted down any event that answered the research questions posed by this study. The researcher observed if teachers were using instructional technology and if they had good TK, TPK, TCK as well as determining if any of the teachers were in possession of TPACK.

3.4. Data Analysis

De Vaus (2001:9) is of the opinion that "the function of a research design is to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible". In order to answer the initial questions asked, the researcher used semi-structured interviews as a data collection instrument. In qualitative research the aim is to seek understanding and extrapolation of similar situations (Hoepfl, 1997). Henning (2004) endorses the analysis of qualitative data right from the onset of the data collection process, with the researcher continuously reflecting on connections and relations as the researcher continues collecting, dividing, categorizing and grouping data into more meaningful smaller units.

Interviews with the participants were recorded and transcribed. The researcher read and re-read the transcripts a few times over to ensure the transcription process was accurate and error free. Re-reading the transcriptions also helped the researcher formulate a deeper understanding of each individual participant's experience. Data analysis must be undertaken in relation to the research problem and aims of the study (Walliman, 2011). Walliman stated that the nature of the research problem will determine which analytical method must be incorporated. A qualitative analysis was used, specifically coding. Walliman (2011) describes coding as forming typologies and taxonomies from copious data (in the form of notes or transcripts) by identifying differences in the data thereby forming subgroups within the general category. Maree (2007) claims that coding is when transcribed data is read prudently line by line and divided into significant logical units.

After the data had been collected and transcribed, the researcher coded it. The qualitative data analysis was undertaken following an inductive approach being used. Induction is a scientific activity that leads people to make conclusions from their everyday experiences (Walliman, 2011).

Creswell (2014) argues that the inductive approach starts with the researcher gathering information from the participants and then forms the acquired information into themes, which are later developed into broad patterns which are then compared to existing literature on the topic or personal experiences. The researcher subsequently opted for the inductive approach in order to generate themes based on the data collected.

Figure 3.1. below shows the inductive reasoning in qualitative studies

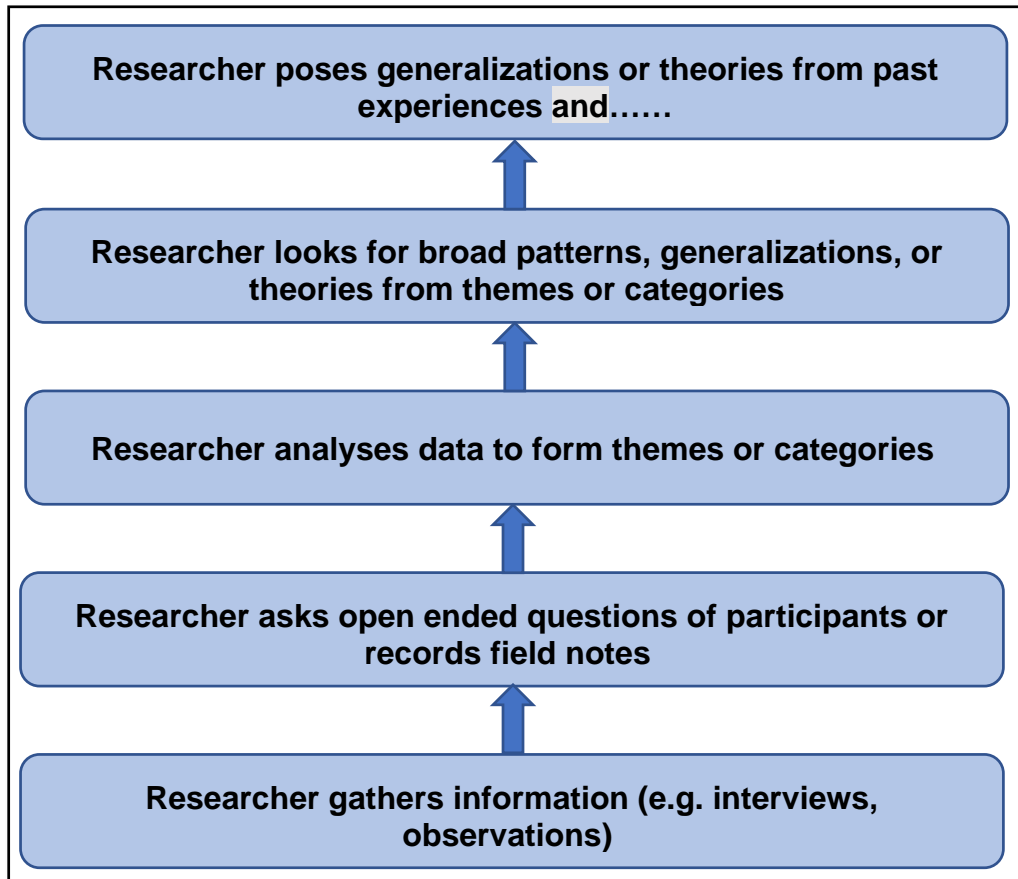


Figure 3.1: Inductive reasoning in qualitative studies

Source: (Creswell, 2014)

While inductive approach for data analysis was used, premeditated themes from the TPACK framework were used to group the findings. This means both inductive and deductive approaches were used to analyse the collected data.

The researcher focused on each of the aspects of the TPACK framework and checked if the participants possessed all the 7 aspects that make up the TPACK framework. The aim of this exercise was to determine if the participating teachers did not have an aspect like Technological Knowledge (TK) and Technological Pedagogical Knowledge

(TPK) and if this would have a bearing on their willingness or ability to integrate instructional technology into their classrooms.

3.5. Trustworthiness

Marshall and Rossman (2010) point out that trustworthiness ensures the reliability of results obtained by a study. Credibility, transferability, dependability, confirmability and reflexivity, among others, were used in this study to prove the trustworthiness of the research findings. These components, which are discussed in more detail below, were applied to both the interviews and observations which formed the data collection instruments for this study.

Lincoln and Guba (1985) mention that in order to guarantee trustworthiness in qualitative research there are aspects that must be followed. These aspects are prolonged engagement, persistent observations, structural corroboration, referential adequacy, member check, and triangulation. Prolonged engagement is when a researcher is in the classes for an extended amount of time in order overcome situations where teachers change their teaching style particularly because the researcher is sitting in the class. Lincoln and Guba (1985) continue to postulate that by attending many lessons respondents become used to the presence of the researcher and that way the data collected is free of any distortions. Creswell (2014) is of the opinion that prolonged engagement gives a deeper understanding of the issues being studied. Furthermore, the more experience the researcher has with participants in their setting, the more valid the findings will be. Persistent observations are used in order to identify traits relevant to the study. Referential adequacy is when the researcher tests his interpretations against various sources of data (Lincoln and Guba, 1985).

In an attempt to establish trustworthiness, the researcher used member checking. Member checking is when the researcher took the themes or the final report back to the participants in order to determine whether the participants feel that the findings are accurate (Creswell, 2014). Member checking was used so that participants may see that the transcribed words are their own and that the researcher did not add or remove any information. Data triangulation was also undertaken. This is whereby the researcher used information from different data sources, e.g. observations and

interviews, to build themes and a coherent justification for themes thereby adding validity to the study (Creswell, 2014).

According to Creswell (2014) clarifying researcher bias is another way of establishing trustworthiness. He posits that self-reflection creates an honest narrative that resonates well with the readers. Additionally, it clarifies how the researcher could be affected in terms of interpretation based on their background and other factors like gender and culture.

Trustworthiness is of paramount importance to qualitative research. Three facets of trustworthiness were taken as areas of focus for the study — namely credibility, dependability and conformability. Credibility ascertains that the results obtained by the research are authentic. This was achieved through going over the data to make sure that no themes were omitted. Credibility ascertains that the participant's personal views on the area of study are acknowledged, and that the researcher will make sure that data collected indicates this. Dependability is when the researcher makes sure that the research process is sound and audited (Schurink et al., 2011). Dependability means that if the study was to be repeated under the same context with the same participants, results obtained would be the same.

Conformability necessitates that result obtained from the study will be results of the experiences and ideas of participants as opposed to the partialities and bias of the researcher (Shenton, 2004). The researcher clearly explained the questions to the participants to try to be objective and give responses not leaning on their biases. By interviewing the participants repeatedly, the researcher increased his chances of being able to distinguish a response that is biased. The researcher probed further to make sure answers received were bias-free.

When the researcher started doing interviews at the schools there was an element of bias that could creep in. The researcher did not let his personal feelings influence the data collection process. He was impartial and did not influence the participants in any way. Table 3 below shows the steps taken to ensure trustworthiness

Table 3.2: Steps taken to ensure trustworthiness

Credibility	The use of more than one source of data and more than one data collection method; use of member checking and allowing participants to review synthesis of interview data.
Applicability	Interpreting data in accordance with research questions; use of member checking and allowing participants to review synthesis of interview data.
Consistency	Ensuring consistent compliance in terms of data collection methods; detailed descriptions of participants' sample, data collection methods and strategies for analysis.
Neutrality	Ensuring non-interference. Recording as truthfully as possible, raising additional questions where necessary.

Source: Krefting (1991:215)

3.6. The researcher's position

Due to the fact that the researcher works at the schools where data was collected, there was a disposition to lean towards certain themes and actively seek evidence to support these themes. The researcher became vigilant not to lead participants in certain ways. Participants spoke freely and all information was recorded verbatim. The researcher was merely a facilitator and did not try to lead participants in any specific direction. Another possibility that arose was to try to paint the school in a positive way as the researcher works there and was interviewing his superiors. In this regard the researcher interpreted the data collected as it was presented and did not allow the association with the school to influence how the data was interpreted. Furthermore, the keeping of the names of the schools anonymous made the participants feel safe to say their mind allowing for genuine data to be collected.

The researcher also had opinions about the schools because of his association with them. However, the researcher did not let these opinions influence him or cause participants to answer questions in a particular manner. The participants were allowed to answer the questions as they saw fit with no interference whatsoever from the researcher. In order to keep the data collected as accurate as possible the researcher held himself responsible to make sure that data collected reflected the participants view as accurately as humanly possible. The researcher's perception on challenges of instructional technology integration was shaped by the researcher's own experiences with instructional technology integration when he was still a primary school student.

The researcher admits this may have a certain bearing on the way the researcher views and understands the collected data. To this cause every effort was made to ensure objectivity.

3.7. Ethical considerations

Ethics deal with ideals of what is right or wrong (McMillan & Schumacher, 2006). Ethics are a set of principles for good professional practice, which advise the researcher on how to conduct their study (Bloor and Wood, 2006). The researcher obtained ethical clearance from the Cape Peninsula University of Technology and the Western Cape Educational Department (WCED) (see appendix C and D respectively). The researcher obtained authorization from the school principal and teachers from where the data was collected (see appendix E). Anonymity was guaranteed and all participants were made fully aware of what the research entails. At any stage participants could withdraw as participation was entirely voluntary.

Kumar (2005) concludes that it is unethical to collect data without getting permission of the participants and without getting their consent first. In respect of the above the researcher explained the purpose of the study to all involved participants so they could willingly decide whether or not participate in the study. The names of the schools are not included in any of the data collection forms as suggested by Bloor and Wood (2006). The names of the teachers were also not included in the study. Pseudonyms were assigned to describe the teachers as teacher A, teacher B and so forth. No research participant was coerced into participating in the research. The researcher was the interviewer. The researcher visited the school with permission from the WCED and ethical clearance from the university. The researcher on his part as interviewer did not suggest or lead the interviewees in a certain direction through leading questions. He was guided by the semi structured questionnaires.

3.8. Chapter summary

This chapter has described the research methods and methodology of the study on challenges they encountered while integrating instructional technology in their schools.

The researcher has clarified the processes that were followed in collecting and analysing the data. The data instruments used have been discussed and the reason why they were opted for. The researcher has also detailed why he opted for a qualitative approach together with issues relating to conducting research within his own work place. This chapter has also dealt with a spectrum of relevant concepts, including triangulation and validity. In addition, this chapter also explored the ethical issues and steps the researcher took to conform to the ethical considerations of valid research. In the next chapter the researcher presents the data from the various data sources and begins the process of analysing and interpreting the data.

CHAPTER 4
FINDINGS OF THE STUDY

4.1. Introduction

This chapter presents the findings of the study. The main purpose of this chapter is to describe how participant responses aided the researcher in answering the research questions. The chapter makes sense of the data and presents the acquired information in a sensible and sequential manner.

Semi-structured interviews and non-participative observations were the tools used to collect data for this study. The researcher sought to ascertain the challenges teachers faced while integrating technology in a school in the Cape Flats. The interviews helped the researcher to explore teachers' perspective on challenges they faced while integrating technology in their classrooms and how the challenges were mitigated. Observations showed how many teachers used instructional technology, and of those who use instructional technology the researcher observed the levels of competency. Integration of instructional technology in curriculum delivery is of interest because literature suggests that in order to master 21st Century learning skills, the curriculum should incorporate technology.

Ten educators agreed to participate in this study. These participants are referred to using pseudonyms; Teacher A to J for purposes of identification and to guarantee anonymity. Presented herein are the findings of various data sources under separate themes. Verbatim quotations were written in *italics*.

The key questions that are guiding this study are:

What are the challenges that affect in-service teachers' integration of instructional technology into pedagogy in Cape Flats primary Schools in the Western Cape?

Sub-questions

1. What challenges do in-service teachers face when using instructional technology in schools on the Cape Flats?
2. What do teachers perceive as the benefits of using instructional technology for curriculum delivery?

Following the data analysis as explained in Chapter 3, the following main themes were developed:

1. Teachers' familiarity with the integration of instructional technologies
2. Challenges facing teachers on use of instructional technologies
3. Advantages of integrating instructional technology for curriculum delivery

The above three themes were recognized from the data. The first theme concentrated on Teachers' preparedness on use of instructional technology. The focus was on what instructional technology teachers' felt adequately trained to use in their classrooms. It dealt with their experiences using and integrating instructional technology or the lack thereof. The second focused on challenges with instructional technologies, that is, what challenges teachers had with instructional technologies and if these played a role in their decision to integrate it into their daily practice. The third dealt with how teachers integrated instructional technology. This focuses on the processes they went through as they decided which instructional technology to use and how to use it for curriculum delivery.

The rest of the chapter is structured into the following sub-sections:

- 4.2 Teacher familiarity with the integration of instructional technologies
- 4.3 Challenges facing teachers on use of instructional technologies
- 4.4 Advantages of integration of instructional technologies for curriculum delivery
- 4.5 Summary of chapter

4.2. Teacher familiarity with the integration of instructional technologies

This theme fixated on Teachers' readiness on use of instructional technology for pedagogy. The focus was to ascertain if teachers were making use of it in their various in classrooms. Furthermore, the researcher wanted to determine if teachers had been trained during teacher education to effectively use instructional technology for effective teaching and learning. The growth of the global economy and the information-based society has pressurized teachers to integrate technology into their teaching and learning (Omariba, Ndichu Gitau & Ayot, 2016). In South Africa, the Department of Education aims to encourage teachers in this regard by providing technological

equipment to public schools. As such, it was important to determine teachers' training on use of instructional technology for pedagogy and if this was an influencing factor in their decisions to integrate it into daily teaching activities. This theme was important because Nkula and Krauss (2014) are of the opinion that many schools in developing countries such as South Africa do not have access to technology despite the advantages posited by instructional technology. As such, it is utterly crucial to determine if teachers had been trained or had experiences with utilising instructional technology and if they were successfully integrating it in practice.

The researcher posed the question 'do teachers use instructional technologies for pedagogy in their classroom or not'. The following were the responses from some of the participating teachers:

Yes.....learners develop interest when I am teaching using instructional technology. (Teacher A)

Yesit makes teaching and learning easier and it gives more clarity of new topics to the learners (Teacher D)

No.....Because western cape educational government did not bring enough resources for the whole school. (Teacher G)

It is clear from the above responses that regarding the use of instructional technology for pedagogy, most of the teachers reported that they used instructional technology for teaching and learning whereas some reported not utilising it because of a lack of resources.

Having recognised teacher familiarity with instructional technology, it was essential to determine the level of familiarity. This objective was obtained by observing if teachers were utilising instructional technology in their classroom as reported during interviews. It was vital to understand the reason why teachers would integrate instructional technology. Keen interest was on engaging those teachers who did not integrate technology to ascertain if they had received any training on how to use instructional technology for pedagogy.

The researcher asked the interviewees if they utilised any instructional technology for curriculum delivery. The responses were compared against what was observed to see if teachers really were using instructional technology in their lessons. Out of the ten respondents, 70 (%) indicated to utilising instructional technology for pedagogy. Teachers were beaming about the positive impact instructional technology had in the classroom. The following was what some of the teachers had to say in connection with utilising instructional technology:

More usage of instructional technology can make the learners more responsible and manageable (Teacher B).

Instructional technology communication or interaction with the learners, learners will be able to see videos (Teacher C).

I often incorporate instructional technology in my lessons in order to reach the various learning abilities, make lessons more interesting and interactive (Teacher F)

The school has a smaller number of laptops, more educators and more learners (Teacher H)

The responses above indicate that some teachers do not use instructional technology because of miniscule numbers available in schools. **Teacher (H)** stated that she was not using technology because there was a very small number of technological devices at the school, basically the technology resources provided were not enough to meet the demand considering the number of students and teachers. It was a common thread among most teachers who declared that they did not use instructional technology because of limited resources in the schools. This combined with the fact that schools the Cape Flats are not financially strong meaning they don't have the capacity to get technology devices on their own if the department does not chip in or some well-wishers. Voogt and Tondeur (2015) found a similar result, and postulate that poor infrastructure discourages teachers in poor schools from using technology. Voogt and Tondeur (2015) further postulate that financial and connectivity problems were seen to discourage teachers from using instructional technology.. Stols et al. (2015) clearly

points out that too many teachers lack time and this was a common cause for teachers to have an unfavourable view on integrating instructional technology into their classes.

These results illustrate that most teachers in the sampled public schools had familiarity with incorporating instructional technology in their classroom teaching. The few teachers who did not utilise instructional technology indicated both internal and external factors as reasons for non – usage. These will be discussed in depth in the following sections.

The researcher observed lessons of all the participants involved in the study. The reason was to see if claims made by educators that they knew how to utilise instructional technology in their teaching had any basis.

*Do I have technical skill... yes, I do have? They have enabled us at school to do... to use the technology. I did not do computers at university or college, but we had classes here, endless classes here where the department sends people to educate us how to use the technology (**Teacher J**).*

Despite teacher J stating she used technology in her lessons, the observations actually proved otherwise. Despite Teacher J having gone through training sessions she still did not utilise instructional technology for curriculum delivery she used chalk and board. The reasons as discussed in this section included theft, lack of the technological devices and lack of time.

What is interesting to note is that most of the teachers used instructional technology for curriculum delivery as they had stated in the interviews. What constituted as using instructional technology in most of these cases was using a laptop attached to a projector, with PowerPoint slides being displayed on a white board. In some cases, they used the projector to play videos for the learners. Using instructional technology to play videos has advantages for the learners, as stated by Stoilescu (2011 citing Kaput and Thompson, 1994). Facilities like videos and audios offer better teaching and learning opportunities compared to static media by providing opportunities for lively interactions. Therefore, by integrating videos into teaching, educators are providing a better learning experience for their learners.

Word documents were used by some educators to put up questions. The teacher would work these out on the white board as learners took down notes. there is comfortability/familiarity of old technology compared to new. Also, the teachers are clearly using technology at very basic level, like projection, while this does improve experience for learner, it could be further integrated for better impact None of the educators in this study utilised the interactive white board (IWB) for curriculum delivery. The way instructional technology was utilised in these Cape Flats primary schools by some of the educators concurs with what Nkula & Krauss (2014) found when they noted that instructional technology in many poor schools in developing societies like South Africa is 'implemented without integration'. Implementation with integration is a situation where students utilise instructional technology to learn, with instructional technology being an integral part of curriculum delivery (Nkula & Krauss, 2014). Some teachers used instructional technology to merely display information, acting more like a substitution of the traditional chalkboard Due to limited technology knowledge (Omariba, Ndichu Gitau & Ayot, 2016). It is possible that this is due to limited Technology Knowledge as the teachers seemed familiar with only the basic functions of the instructional technology.

The responses above prove how teacher's familiarities with technology varied from one teacher to the next. Some educators did not use technology at all while some used it daily. Factors that influenced usage include educators being taught how to use instructional technology for curriculum delivery during initial teacher training as well as on the job training.

Teacher familiarity helped to answer the main research questions which sought to identify the challenges that affect in-service teachers' integration of instructional technology into pedagogy in Cape Flats primary Schools in the Western Cape. Familiarity was gained through initial training during teacher training. Secondly, workshops conducted at schools provided familiarity. Getting learners familiar with instructional technology during teacher training proved an important factor to encourage integration of instructional technology for pedagogy.

4.3. Teacher challenges with the integration of instructional technology

Teacher challenges refer to problems or situations teachers may face that affect their attempts to integrate instructional technology for curriculum delivery. This theme was brought up in attempt to answer the first sub question. To obtain data about challenges teachers faced with integrating instructional technology for pedagogy the researcher asked the participants if there were barriers, they felt they faced which hindered or made it difficult for them to integrate instructional technology for pedagogy. The following are some of the responses:

*There is quite a few. One, we do not have internet connectivity in the school. We have Wi-Fi, government Wi-Fi in the school but its only available about a 10-metre radius from the admin block. In my class now I do not have connection to the internet... The other challenge is breakages at the school. Uhm I cannot leave my data projector here hanging on the roof like that. I must take it down every day and carry it home every day. This has increased wear and tear of the machine (**Teacher G**).*

*One of the barriers is the fact that some teachers do not know how to use the technology. So, the barrier is that most of the teachers do not know how to use the equipment. That is one of the greatest barriers, and because they feel they have a problem they tend not to use it at all. They just talk through (**Teacher B**).*

*Like I said only lack of Wi-Fi, then you will be forced to go back to the board, and you have to be prepared (**Teacher F**).*

*Yes, we do have a lot of barriers in technologies with the curriculum. Like I said the curriculum is so stacked up that you do not have the time to really plan technological lesson on a topic because it means to be 1 period then tomorrow you have to do something else again (**Teacher A**).*

It is evident from the response of the teachers that challenges affecting integration varied from one individual to another and from one school to the other. Reasons ranged from erratic Wi-Fi signals to theft, lack of time, lack of technical support and teachers

being unable to utilise the technological devices. The reasons stated by the teachers were also discovered by Mentz and Mentz (2003) who concluded that the reasons for poor integration of instructional technology for pedagogy in South African public schools included absence of proper security which led to vandalism, lack of formal teacher training on use of instructional technology for pedagogy, absence of services like electricity and high teacher to learner ratio. So, it's important to note that despite teachers having knowledge to integrate instructional technology there were other challenges that hindered them from successfully integrating instructional technology for pedagogy. Therefore, it can be concluded that it's not merely a single challenge that affects teacher's ability to integrate instructional technology for curriculum delivery, but rather a combination of challenges.

Every participant involved in the study was of the opinion that instructional technology has a role to play. However, when it came to the Integration of the various instructional technology there were varying levels of integration. In this section, the researcher outlines the finding around challenges that act as barriers in the integration of instructional technology by teachers.

4.3.1. Poor Infrastructure

Infrastructure refers to the devices and environment that allows for instructional technology to be integrated. Voogt and Tondeur (2015) noted poor infrastructure as a factor that discouraged teachers in less affluent areas from integrating instructional technology.

Poor infrastructure may include poor WIFI connection, absence or shortage of computers, absence or shortage of projectors and absence of electricity. Teachers had the following to say about the infrastructural barriers they encountered in their quest to integrate instructional technology for curriculum delivery.

*Well some of the challenges would be connection. Wi-Fi connection may be poor or sometimes you cannot actually use the internet and the projector. So, you have to research the internet stuff or do your internet stuff before you use a projector in class (**Teacher A**)*

I do not have the technology devices in my class due to theft. (Teacher B)

The mentioned barriers made integration a challenge and discouraging teachers from utilising instructional technology for pedagogy. It is therefore, evident from the data that there is a massive outcry among teachers on the prevalence of poor infrastructure and how it is a challenge that is affecting their practice. When an educator cannot access the internet when he/she wants to use it during a lesson it acts as a detriment for future integration of technology. There is therefore a need to not only supply resources to these schools but providing adequate resources.

As stated by Teacher G above, other challenges includes issues like erratic Wi-Fi connections and theft. Schools in Cape Flats areas are generally poor, located in resource-constrained areas which and are usually infested by criminals. The schools experienced break ins and some of the instructional technology devices were stolen. Stolen resources mean no access to the technology that was previously available and this restricts the use of instructional technology by the teachers in these schools. Thus, many schools in these areas need more security to safeguard these resources to ensure the ongoing facilitation of instructional technology integration. Teachers must connect the projector every day and disconnect at the end of each day. Integrating instructional technology means they have to carry the devices in and out of the class whenever they want to use it. This make the process of instructional technology integration very tedious and consumes into lesson time. Consequently, teachers end up opting not to integrate instructional technology. Ongoing theft means that some of the technological devices are not available to teachers. Teacher B perfectly drives this point home as stated above.

According to (Stols et al., 2015) the reason why educators were not integrating instructional technology for pedagogy in less affluent schools was because of the burden of connecting the technological devices every morning, which in itself, takes time from the ongoing lesson. They further point out that many teachers' lack of time was a common problem. Thus, many teachers view instructional technology as a tool that will consume time that they already do not have. This creates an unfavourable view among teachers on integrating instructional technology into classes. Instructional technology is supposed to make curriculum delivery less time consuming. Once the

use of instructional technology starts consuming time teachers fall back onto old ways of curriculum delivery.

Poor infrastructure is a challenge that affects the use of instructional technology for pedagogy. Thus, schools in Cape Flats areas should receive financial aid to deal with situations like breakages and to invest in better security measures. They also need money to replace or fix damaged devices. It is imperative for schools in Cape Flats areas to be assisted financially to deal with structural problems prevalent in these schools.

4.3.2. Lack of support structures

Support structures include supporting teachers with problems like connectivity, problems with booting laptops and teacher professional development to successfully integrate instructional technology. Voogt and Tondeur (2015) posit that one of the key failures of programmes in African countries was the lack of support for teachers' professional development despite schools being provided with technological devices. The issue of support was raised by some of the teachers. Some postulated that they had never been trained extensively on how to integrate instructional technology into the pedagogy. Thus, support is very important in order to encourage the instructional technology integration and change teacher perception on the use of technology. This is very important as teacher opinion on the importance of instructional technology in curriculum delivery actually plays a major role as to whether the teacher actually integrates technology or not (Nkula & Krauss, 2014).

So here at the school they have not been taking place as I said our ICT committee is not active. Uhm they are all on their own, they do not meet regularly. They are all on islands of their own now. They do not collaborate (Teacher D).

I'm fresh out of college, and from my time here there has, not been any training whatsoever. But I heard the other teachers where trained when the lab was built, but personally no, no training has been offered. So, most of the knowledge I picked it up during varsity and we have technology around us so I usually I learn these things as they come along (Teacher C).

Teacher D showed his distain with the ICT committee and its lack of activity, and how it really did not support teachers to build familiarity and confidence with integration for curriculum delivery. For him, this is the reason why many teachers at the schools were not utilising familiarity with the integration for curriculum delivery.

*Uhm barriers to use technology are the ICT committee is not fully active and not proactive (**Teacher D**).*

It is then evident from the words of Teacher D that the lack of activity and support from the ICT committee inhibited the integration of instructional technology by some teachers. Teacher C also noted that there are no structures for professional development. He stated that that training took place only when the lab was built and nothing, ever since. This means teachers who came after the initial training were not enabled to use instructional technology. If they did not have knowledge of integrating instructional technology for curriculum delivery already, they would have been left to their own devices regarding integrating instructional technology in the classroom. This then brings to the forefront the need for teachers to have a support system to enable them to have their problems addressed. Literature furthers this point by stating that principals should provide support to the teachers by putting in place measures for professional development (Hayes, 2005). Tondeur et al. (2016) adds to the argument stating that peer support reinforces teacher beliefs and the sharing of ideas amongst teachers regarding instructional technology brings out ideas on how to use instructional technology to support student-centred teaching. Chigona and Chigona (2010) continue to state that they also discovered that teachers who were supposed to be using instructional technology did not have enough technical support to help them integrate the instructional technology. They found that when teachers needed technical help the technicians would come at their own time, and teachers were left waiting for long periods. (Chigona and Chigona, 2010). This derails teacher enthusiasm to integrate instructional technology as they will not be able to use the instructional technology when they want to and when it malfunctions, they cannot use it again. As such, the lack of support came as a factor that caused teachers to have little enthusiasm when it came to the integration of instructional technology. This needs to be addressed if more teachers are to integrate instructional technology in this schools in the Western Cape.

It is important that schools have a fully functioning committee, as this allows for teachers who may not have been previously exposed to instructional technology to get the know-how on how to use instructional technology. This point is clearly illustrated by teacher G below.

*That is how I learnt to use technology. I did not learn through formal training. Whenever I get stuck on something, I approach one of those ICT guys in the committee and ask them how to navigate this problem, and they assist me. And yah, that is how I acquired most of my skills (**Teacher G**).*

Having support structures for instructional technology integration is critical for teachers previously unacquainted with instructional technology. The importance of such structures was shown by how Teacher G learnt to integrate instructional technology for pedagogy despite not having been trained previously to do so. It must, however, be noted that Teacher G first had to see the benefits posed by instructional technology before he decided to learn how to integrate instructional technology for curriculum delivery. This brings to the forefront the importance of a teacher's attitude on whether to integrate technology or not. This means that if a teacher has a desire to integrate instructional technology, they may take all necessary measures to make sure that they accomplish the goal.

Thus, support structures are important for teachers. These teachers may have a phobia with regard to the use of instructional technology and having a form of support would help curb any fears they may have. Also, having a system where if a problem arises you can call on experienced personnel to help is important and would encourage more teachers to utilise instructional technology. Therefore, schools need to have a policy on how instructional technology is to be integrated and must have a follow up plan to address the concerns any of the teachers might have. Once a teacher knows that there is support if they ever need it, they will be encouraged to use instructional technology in the classroom for pedagogy.

4.3.3. Teacher beliefs on the importance of instructional technology for pedagogy

Teacher belief refers to the opinions teachers have about the importance of instructional technology for pedagogy. It refers to the influence these beliefs have on the teacher's decision to integrate instructional technology for pedagogy. If a teacher believes instructional technology has advantages in the teaching, they will go out of their way to learn how to use the technology effectively. But if the teacher feels that they don't benefit from the use of instructional technology they will not integrate instructional technology in their classroom for pedagogy. Literature supports this notion with Leendertz (2013) postulating that to fully understand instructional technology integration, teachers' pedagogical beliefs have to be taken into account, This is further supported by Marcinkiewicz (1993) who points out that there is a need to study teachers and understand what makes them integrate instructional technology.

It is important to understand that even if schools are equipped with instructional technology the role of the teacher who must integrate the instructional technology must be understood. If we have teachers who feel instructional technology is not important, or that instructional technology is a distraction then getting full technology integration may not be realised. However, according to the NDP, education is a national priority in South Africa. Instructional technology is seen as a tool that can be used to increase learner performance in this subject (Stols et al., 2015). It is, therefore, essential to align these values and objectives with those of teachers on the ground to ensure that they see the importance of utilising the technology to facilitate 21st Century learning outcomes.

*Everything is technological these days. So, you see the computer makes things better like I said, and they will understand your topic much better and then (Uhh) like I said it will also improve your lesson and will make you more up to date with technology (**Teacher C**).*

*...go hand in hand, that is true yes. The teachers stuck in the old chalk and board cannot get similar results with someone using technology. I do not think so, you know? (**Teacher E**).*

*If it is used optimally it has the potential to make a difference in learner performance in all subjects. It all depends on how you use it, because technology is there to make our lives easier and technology is going to be here forever. So, there is no way we can run away from it. We have to embrace it. It is here to stay. I can see for myself since I started using technology, I can see that even my teaching has improved and consequently that rubs off on the learners as well. Their level of understanding seems to be improving by day, but it is not an overnight thing. It is a process (**Teacher G**).*

We can see from the above comments from the teachers that they believe that instructional technology has a role in the teaching and learning . Teachers state that instructional technology was beneficial as it helped make their lives easier, helped improve the quality of teaching, helped improve learner results as learners would have been taught more efficiently using instructional technology. All of the teachers who were sampled for the study believed that instructional technology helped make their lives easier, and that it was the future for teaching because of the numerous benefits it posed.

What was interesting to note was that despite all teachers having a positive view on the classroom not all teachers integrated instructional technology. This was as a result of various challenges that were outside the teachers' control like lack of training, lack of support, absence of instructional technology devices or theft. So, despite teachers having positive attitudes towards the integration of instructional technology for pedagogy these challenges still hindered them from integrating instructional technology for pedagogy.

*To learn at their own pace is definitely the main advantage. Also, to see a different point of view other than my own. So, there will be a different take on it. Maybe they did not get it when I explained. Maybe they will when someone else. You offer the learner various points of view and hopefully that will be something that they build up (**Teacher I**).*

Learners can only benefit from technology as it allows them access to problems, explanations, and methods beyond the classroom borders (Teacher E).

Teacher I and Teacher E clearly hold the position that instructional technology has advantages and benefits. These range from allowing a different voice to teach learners by means of a video and allowing learners to have different points of view on a topic. Despite having a positive attitude towards instructional technology, Teacher I and Teacher E did not integrate instructional technology in their classrooms. The following were their reasons:

I do not have the technology devices in my class due to theft, however I am very willing to use it as I can see the need to keep up with the new methods of teaching that involve technology (Teacher E).

Here we do not have Wi-Fi so we cannot uhh display everything on YouTube or anything like that. I'm a bit limited umm I have to get the projector out of my own pocket. And, umm I do not know how I'm going to get it installed. That is another story but we will figure this out because I think my projector is almost here (Teacher I.)

It is evident from the above that despite these teachers having a positive attitude towards the integration of instructional technology they were limited by external factors such as theft and unavailability of instructional technology devices at the schools where they taught. This brings a very important discovery. Teacher beliefs are very important regarding the integration of instructional technology for pedagogy as concluded by Polly & Hannifin (2010). Teachers' attitude and beliefs play a determining role in the integration of instructional technology in the class. The results in this study prove that most teachers do admit that instructional technology does have a role to play in education. However as in the case of Teachers E and I other barriers such as theft and unavailable instructional technology made it impossible for them to integrate instructional technology for pedagogy in their classrooms.

. Another factor that contributed to the lack of technology uptake was presented by Teacher E who noted that she did not use instructional technology because she was

stuck in her old ways and was satisfied with the results she got from these traditional teaching methods.

I have not expanded to the use of technology because I am stuck in my old ways and the results, I get from it ...but I am open for the incorporation of technology (Teacher E).

Teacher E had a positive attitude towards instructional technology but factors like being stuck in her traditional teaching prevented her from integrating instructional technology. This means that when looking at the integration of instructional technology for pedagogical use it is very important to look at the whole spectrum. Merely providing technology is not enough, it is essential to acquaint teachers to the benefits of moving from old to new technology enhanced ways of teaching. It is also relevant to ensure that these teachers receive continuous developmental support in this area so that they do not lose sight of the value of integrating technology, which usually results in them reverting to traditional ways of teaching (Chigona, 2015). It is important to train teachers to use instructional technology. It is important to show them the benefits instructional technology has and it is important that these schools have the instructional technology which is properly secured. If all these things are effectively implemented, then chances of integration of instructional technology for pedagogy are greatly improved.

4.3.4. Lack of training on integrating instructional technology for teaching and learning

Lack of training refers to absence of formal training at university or teacher training institutions on how to effectively integrate instructional technology for pedagogy. It also refers to workshops that can be held at schools to make teachers aware of the various instructional technology available and showing them also how to effectively integrate them for pedagogy. A common thread that also came out during the interviews was the lack of proper training on how to use and integrate technology among teachers. Those teachers who had not received proper training were, as a result, not confident enough to integrate instructional technology in their classrooms. Hayes (2005) agrees with the above statement on the importance of training and states that principals should provide support to teachers by putting in place measures for professional development.

He continues to state that it is important to offer support to teachers, and to also have structures such as an ICT plan and ICT training (Hayes, 2005). Teachers' responses are noted below on whether they had received training on integrating technology for pedagogy.

*Not really, thorough training was only for over a period of just one session, not many! I have forgotten most of what I have been taught (**Teacher E**).*

Teacher E, who did not integrate instructional technology for pedagogy, said she had not received adequate training regarding the integration of instructional technology for pedagogy. She stated that there was just one session she attended, and she did not remember most of what had been taught there. So, Teacher E had low confidence in using and integrating instructional technology and as a result she did not integrate instructional technology into her teaching practice. This shows how important it is to train teachers to effectively integrate instructional technology for curriculum delivery. Chigona (2015) discovered in her study that newly qualified teachers were not integrating instructional technology due to the poor training they received during their teacher education. Once teachers know how to integrate instructional technology, they will have the confidence to implement it in the classrooms.

Without TK, teachers will not be able to effectively use and integrate instructional technology for curriculum delivery. Possession of TK is important in order to achieve integration of various forms of instructional technology. If teachers have a high level of TK then it increases the chances of integration. This is driven by their high levels of confidence when using instructional technology. Teacher self-efficacy is an influencing factor in the integration of instructional technology (Tondeur et al., 2008).

The more confident a teacher feels with using technology the higher the probability that they will utilise instructional technology. Buabeng-Andoh (2012) states that teachers' self-efficacy has great influence on the integration of instructional technology. Leendertz (2013) says that lack of confidence is a barrier to instructional technology integration in classrooms. Therefore, boosting the confidence of teachers will result in the teachers becoming enthusiastic and more interested in embracing instructional technology for curriculum delivery. Chigona (2015) agrees with the above positing that teacher efficacy influences whether they integrate instructional technology in their

classes. She further adds that teacher efficacy influences their technological efficacy. Chigona concluded that if a teacher was never trained to use instructional technology that affects their teaching and generates low self-efficacy to integrate instructional technology into the classroom (Chigona, 2015).

The overwhelming positive feedback on the influence of self-efficacy on the integration of instructional technology and the findings of this study show the importance of teaching teachers on how to use instructional technology, and using it properly at a high level. In order to develop a positive self-efficacy among teachers it is therefore important that during teacher education, aspiring teachers are equipped with the necessary skills to be able to integrate instructional technology in the classroom (Chigona, 2015). A teacher with a positive self-efficacy will feel confident enough to be innovative and creative in the classroom (Chigona, 2015).

Most of the participants in this study possessed limited ICT skills. The majority of the participants only used instructional technology in the following ways: PowerPoint presentation, word processing, internet, WhatsApp, emails, overhead projectors, photocopying and scanning. In his response on how he used instructional technology Teacher B said the following:

*Yes, I do. I do I do. (Umm) As you notice the papers I set up on laptops and computers (Uhhm) class work should be on an interactive board. Now this is not an interactive board. This is just an ordinary whiteboard, are you with me? So, I put the cable into the computer, and I play the work from the computer and show the syllabus of the work to the kids (**Teacher B**).*

It is evident as far as Teacher B was concerned that using instructional technology was merely setting question papers using MS word and displaying work on the board. The skills to use instructional technology, though limited for some, were obtained in various ways. For some these skills were acquired in university during teacher education, and for some they were obtained on the job. Teacher C stated the following responding to whether he had been taught to use instructional technology in teacher training at university:

*From varsity, they explain it. There is actually courses where they explain how to use the smart board and that. So ya we got training from varsity already (**Teacher C**).*

A number of teachers, though admitting to have somewhat been trained to use instructional technology, were of the opinion that they needed some more specialised training. As observed, most teachers referred to using instructional technology as merely using PowerPoint presentations in teaching, and this state of affairs calls for further continuous and intense training on using instructional technology for our educators.

Only two of the 10 interviewed and observed teachers (20%) were using ICT in ways other than PowerPoint presentations. These teachers were effectively using instructional technology to enhance learner understanding. Educational software's like the Hatfield online school and Plickers were used to give learners a different angle to learning. What came out of the study is the incredibly low number of teachers that have high instructional technology efficacy and that actually use it effectively. This necessitates the need for additional ICT training.

It was evident from the observations carried out by the researcher that many teachers had good PK, CK and good PCK. However, when it can to integrating technology the TCK was lacking as the instructional technology was being used merely as a substitute for the traditional chalkboard. As previously stated, technological skills alone do not guarantee a teacher's ability to teach effectively with instructional technology. For a teacher to be able to utilise instructional technology efficiently and effectively in the classroom the teacher must be in possession of the following types of knowledge that were discussed in more depth in Chapter 2. The types of knowledge are Technological Knowledge (TK), Content Knowledge (CK) and Pedagogical Knowledge (PK). For effective integration and use of instructional technology, a teacher would need to be in possession of the three above knowledge types and have the ability to use them effectively and efficiently as one.

All 10 of them in this study gave a similar report when asked if they had received enough training to utilise effectively, and if they actually integrate instructional technology for curriculum delivery.

*Remember I was at varsity 30 odd years ago, where there was no cell phones and nothing like that. So uhm the software was given to me and they basically trained us, the people who gave me the software they trained me and my teachers to use the software you know and obviously it gets easier over time. Once you have software, technology. You find other ways to incorporate you know what I mean (**Teacher F**).*

The above response is evidence as to why it is important to train teachers to utilise instructional technology. Teacher F, though not having any formal training on the use of instructional technology, was trained to use instructional technology and now uses instructional technology every day for his curriculum delivery. The conclusion that the researcher reached was that for teachers to integrate instructional technology, teacher knowledge of using instructional technology that is gained through training is of the utmost importance.

Despite receiving training on utilising instructional technology some teachers are not utilising instructional technology in their curriculum delivery as previously discussed. This trend is supported by literature as noted by Chigona and Chigona (2010), in their study looking at ICT integration in the Western Cape. They noticed that not many teachers were incorporating instructional technology in their classes despite having received training through the Khanya project. They continued to state teachers were still uncomfortable utilising instructional technology in their classes signifying that the training they received was inadequate. The participants in this study reiterated the statements above by stating that they felt that they needed additional training to fully integrate instructional technology in their classroom.

Training was noted as something that was really needed as the researcher noted that some teachers were only learning how to use a computer to type examinations and assignments. Something so basic was a novelty to some of the older teachers. This alone showed the need to train teachers to utilise instructional technology. Teacher B, with the most experience of 40 years, had just learnt how to type examinations and inserting equations on Microsoft word. This shows he was still a novice as far as technology was concerned. You cannot therefore expect such a teacher to be able to fully integrate instructional technology for curriculum delivery as it is understood he will not be able to do so.

Teacher E, with 15yrs of experience, claimed not to use technology at all as she was stuck in her olden ways of teaching which produced the results. However, the younger teachers who were fresh from university claimed competency in using technology. This trend goes along with what was found by the U.S National Centre for Education Statistics (2000) which stated that teachers who had been teaching less years used computers more than teachers who had been teaching for longer periods.

The trend noted in this study, however, contradicts the findings by Buabeng-Andoh (2012 citing Lau & Sim 2008) who in their study discovered that younger teachers were integrating instructional technology less as compared to their experienced counterparts. Also contradicting the results of this study is Chigona (2015) who discovered, in her study, that while newly qualified teachers are expected to integrate instructional technology anecdotal evidence shows that not many are successful due to poor training from their teacher education. The conclusion was that teachers are qualifying without the specialised skill needed to incorporate instructional technology into their classrooms.

Buabeng-Andoh (2012 citing Bebell, O'Dwyer, & O'Connor 2003) continues with this line of thought stating that the reason why older teachers were using instructional technology more as compared to younger teachers is that new teachers' focus was more on how to utilise the instructional technology instead of how to incorporate it into the teaching. Additionally, in their first few years of teaching, younger teachers spend most of their time getting acquainted with the school's curriculum and working on classroom management skills (Buabeng-Andoh, 2012 citing Bebell et al., 2003). Buabeng-Andoh (2012) further clarified that additional factors that encourage confidence in the integration of instructional technology are having time to practise integrating instructional technology and training on how to effectively use them.

As aforementioned, training is very important as it equips teachers with the ability to use and integrate instructional technology for curriculum delivery. Nkula & Krauss (2014) summaries the significance of educators being exposed to various forms instructional technology that address technological and pedagogical needs. The driving force behind this thinking was that the willingness of teachers to utilise instructional technology has been noted to be driven by teacher's ability to use instructional technology. Ndlovu and Lawrence (2012) are of the opinion that teacher

training that properly equips teachers to use instructional technology must be advocated for. They emphasize the importance of training surrounding the Technological Pedagogical Content Knowledge (TPCK) as it encourages an efficient integration of instructional technology for curriculum delivery.

Results emanating from this study are pointing to the fact that proper training is lacking amongst teachers in less affluent high schools in the Western Cape. As per the responses from the teachers there is no professional development positions being taken by these schools to train teachers to be efficient users of ICT. One of the schools did have an operational ICT committee but it was not effective in training teachers. There were positives, however, where teachers who required assistance in better understanding of certain software or technology, they received assistance such as Teacher F.

As has been the common thread on all of the themes in this study, solving one issue alone may not be enough to solve the problem of teachers not integrating ICT for curriculum delivery. This will, however, be a step in the right direction. Nkula and Krauss (2014) assert that even though some teachers had received professional development training on the integration of instructional technology, meaning they had the skills required to integrate these technologies, they still showed no interest in integrating instructional technology for curriculum delivery. This shows that sometimes it is a combination of challenges that prevent teachers from integrating instructional technology in their classrooms.

4.4. Advantages of integration of instructional technologies for curriculum delivery

This theme dealt with how instructional technology made it easier for teachers to teach or plan for their lessons. It focused on the positives instructional technology brings about to curriculum delivery. Watson (2015) is of the opinion that instructional technology like the Interactive Whiteboard (IWB) provide teachers with various ways to make lessons creative and exciting for the learners. Findings from this study also go hand in hand with literature as all teachers who were sampled in this study agreed that instructional technology had a positive role to play in education. Additionally, teachers agreed that instructional technology promoted engagement in the curriculum delivery

process. They agreed instructional technology grabbed learner attention and encouraged learners to be active participants in the classroom. Also, some teachers agreed that instructional technology made the teaching process easier and helped lighten the workload.

*“Technology has a role to play yes; it can be used to increase student achievement. But we must be realistic it is not always the best option; sometimes teaching without it is the way to go. So, it is not like it is the Holy Grail that will solve all our problems and make learners start taking school seriously. But when used effectively it does wonders. It definitely grabs learner attention. And by that learners are willing to learn more. For instance, coming to the smart board and writing down answers there is just raises learner interest in the subject as learners would like to come to the front and work some sums out (**Teacher D**).*

*(Uhh) well it enhances the lesson in terms of speed it can speed up the explanation process so that you have more time to have practical work for the learners (**Teacher A**).*

*To learn at their own pace definitely the main advantage also to see a different point of view other than my own so there will be (stuttering) a different take on it maybe they did not get it when I explained maybe they will when someone else. You offer the learner various points of view and hopefully that will be something that they build up (**Teacher I**).*

From the responses of the teachers above we can see that they were of the opinion that instructional technology made their lives easier. Teachers mentioned advantages like grabbing learner attention, providing learners with a different learning perspective and helping the teacher increase the rate at which they cover content. Instructional technology integration provided simplification to teacher’s daily routines. Jhuree (2005) supported the findings of this study by positing that instructional technology also had a capability to make life easier as it made instruction easier, thus easing the burden on teachers who already have a lot on their plate. Awareness of what technology promises with regards to making duties easier for the teacher helps with the uptake and integration of technology .

Benefits like making administration duties easier and allowing engagement for learners make teachers more open to integrating and using instructional technology for curriculum delivery. For instance, a teacher can use instructional technology to extend learning from beyond the physical classroom by allowing learners to communicate with their teachers using applications like WhatsApp. Application like WhatsApp allow learners to easily communicate with their teachers no-matter where they are. This is an example of a benefit instructional technology provides for the teacher. This feeling is supported by literature as Jhurree (2005) found out. She concludes that instructional technology is an extremely useful tool for dealing with administrative tasks for teachers. She further goes on to say that instructional technology allows for an inclusive environment that is highly beneficial especially in areas where learners come from various socio-economic backgrounds, as this gives them access to other sources of knowledge and information beyond their immediate surroundings. Instructional technology thus can provide the means of promoting equal access to education (Jhuree, 2005), it also allows learners to have access to information despite them being away from the classroom.

Teachers had more to say about the advantages posed by instructional technology.

*Firstly, you can use it to gain learner attention you know, and if you are to make learners come and write things on the board it will definitely up their curiosity and this will cause them to be more interested in the subject matter. Smart boards, you can write your answers directly on the question paper, save it and use it again next time. It just simplifies your life if you know what I mean. Oh and there is this software I heard of where u can show a 3d shapes and you can move it around so learners can see how many sides the shape has. There is just many possibilities when it comes to instructional technology man, you know. You just gotta know how to use it and implement it (**Teacher D**).*

The statement above illustrates that Teacher D integrates instructional technology in his lessons because of the educational advantages the instructional technology poses and how it brings about a deeper understanding for the learners. Teacher D admits that instructional technology brings about learner curiosity, meaning it makes learners to be more interested in school. Thus, teachers would integrate instructional

technology for curriculum delivery in order to spike learner curiosity and consequently grab learner attention during the teaching and learning process.

Instructional technology also helps learners who are visually oriented to perform well and excel in their school work. Visual learners are not interested in the traditional chalk and talk and perform better when images and videos are used. Teacher B posits that the reason to use instructional technology is its ability to make life easier. He goes on to say how exposing learners to instructional technology may enable their own curiosity to want to use technological devices. He further adds saying the following:

Well it firstly changes the methodology of the subject to the kids. It introduces a different way of teaching a certain method to solve the problem and it changes the child focus area from the boring blackboard work they now see interactive media being shown by the computer so there is a change, you constantly change the child's approach by using these apparatuses. (Teacher B).

Teacher B obviously possesses TPK as he admitted that the methodology changed based on the instructional technology being used. His reasons for integrating instructional technology were that it introduces a different lens to teaching while additionally making lessons more interesting. Moreover, he noted the ability of instructional technology to make lessons more interactive which in turn encourage learners to construct their own information instead of being passive recipients of information. These results are also supported by literature as averred by Watson (2015) who is of the opinion that technological features such as photos, sound, animations and video are elements that encourage learners to learn and in the same vain enhance teaching by capturing and maintaining learners concentration. They further add on to this by saying that visual learners benefit from good visual resources like pictures and videos. In light of this, instructional technology like Interactive Whiteboards enable lively, exhilarating lessons, drawing from videos and animations from different sources. Therefore, with various instructional technology like the Interactive Whiteboard (IWB) teachers are finding various ways to make lessons creative and exciting for the learners (Watson, 2015).

We can see from the above that videos and pictures enhance teaching and captures learner interest by making lessons more interactive. Instructional technology stimulates visual learners as well as learners with educational barriers. In responses to benefits like this, teachers are thus influenced to use instructional technology in their classrooms.

Teacher C shares the sentiments of Teacher B by stating how instructional technology helps learners understand concepts better. Another thing to note is learners develop a love for computers if they are exposed to them. However, if the teachers themselves do not use computers this may prevent the learners from also having an interest in using or learning about computers.

*Everything is technological these days so you see the computer makes things better like I said and they will understand your topic much better and then (Uhm) like I said it will also improve your lesson and will make you more up to date with technology so the learners who can see when you use me using a computer screen and enabled them to become more how do you say computer literate to be discipline and doing computers and keep up with technology (**Teacher C**).*

Additionally, many educational institutions have begun a process of incorporating the latest instructional technology in order to provide learners with a superior learning environment. However, this is not the case in the area in which the researcher conducted your study, important to point this out. The pushing factor behind the widespread integration of instructional technology lies in the ability of instructional technology to raise and transform teaching and learning to higher levels, and bring about a transformation in the education process by increasing learner engagement (Fu, 2013). Furthermore, another reason why instructional technology integration is so widespread is that incorporating instructional technology in the classroom raises teaching and learning to new levels (Somyürek, Atasoy & Özdemir, 2009; Higgins, 2003). Bester and Brand (2013) concur with Somyürek et al. (2009) and Higgins (2003) arguing that integrating instructional technology encourages learner-centred learning and provides teachers with options to develop skills like comprehension and problem solving in their learners.

Murcia (2010) avers that instructional technology initiates a means for the development of interaction and dialogue among learners. Dialogue and interaction are developed by the inherent nature of instructional technology to create a learner-centred teaching environment. A learner centred teaching environment allows for the creation of an environment where learners are subjected to working together during activities like group work, and by so doing developing learners' dialogue and interaction. Warwick et al. (2010) further added that instructional technology provides an instrument and an environment that encourages dialogue and knowledge construction among learners. When learners are involved in the learning process they enjoy as learners will not be merely passive participants in the lesson. As such Hall & Higgins (2005) found that both teachers and learners report that instructional technology use in education makes lessons enjoyable.

Despite instructional technology possessing several benefits as listed in this section there was still a large number of teachers who were not using instructional technology and the reasons as previously discussed range from poor infrastructure, lack of training and negative beliefs on the role of instructional technology in curriculum delivery. It is therefore a combination of factors that have to be addressed if we are to see teachers integrating technology for teaching and learning. However, most of the the participants did highlight that they were in agreement with the notion that instructional technology improves the teaching and learning experience and outcomes, this implies they were aware of the benefits it offered.

4.5. Summary of chapter

In this chapter, critical factors affecting the integration of instructional technology by teachers in poor areas were dissected and outlined. Despite the acknowledgement of the benefits instructional technology provided to pedagogy, teachers faced a number of factors which hindered their integration of instructional technology. These factors include lack of support, lack of infrastructure and lack of adequate training, theft, low technological efficacy and lack of support structures at schools. These factors along with many others are some hindrances that came out in this chapter that are affecting teachers in the cape flats from fully integrating instructional technology for pedagogy. In order to achieve the perfect integration of instructional technology there is need for plans to be put to rectify these hindrances. This is the only way schools in poor areas

of the Western Cape will be able to have full integration of instructional technology for pedagogy.

In the following chapter, conclusions drawn from the research findings are presented leading to some recommendations

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

The purpose of this qualitative study was to explore challenges teachers faced while integrating instructional technology for teaching and learning and how these challenges were mitigated. Through the use of interviews and observations, the researcher shed light on individual teacher's feelings on instructional technology integration for pedagogy and the reasons why teachers chose to integrate and use instructional technology. The researcher also explored the reasons why they chose to stick to the traditional paradigm of teaching. This chapter focuses on the summary of findings that came out in this study as related to literature on instructional technology in education and the integration of instructional technology by teachers. Also included in this study is the connection between the theoretical framework and the major findings. In conclusion, the chapter will discuss the limitations of the study, areas for future research, and a brief summary.

The key questions that were guiding this study are:

What are the challenges that affect in-service teachers' integration of instructional technology into pedagogy in Cape Flats primary Schools in the Western Cape?

Sub-questions

1. What challenges do in-service teachers face when using instructional technology in schools on the Cape Flats?
2. What do teachers perceive as the benefits of using instructional technology for curriculum delivery?

A qualitative approach was used in this study, and it successfully met the objectives of the study that are listed below. A qualitative approach was believed to be the most suitable as it stayed within the realms of the study's theoretical framework. By utilising this approach, the research questions were answered, and the objectives were also met. The objective of this study that emanate from the aim of the study are:

- To explore the challenges that influence the integration of instructional technology for pedagogy in classrooms of public schools in primary schools.

- To understand challenges that teachers face with regards to integration of instructional technology for pedagogy in their classrooms.
- To provide possible recommendations for primary schools in areas of the cape flats in Western Cape on how to address challenges associated with the integration of instructional technology for pedagogical use

The rest of this chapter is organised into subsections as follows:

5.2 Summary of findings

5.3 Conclusion and Recommendations

5.4 The researcher's final remarks

5.2. Summary of the Findings

This study intended to explore challenges faced by in-service teachers while integrating instructional technology for teaching and learning in Cape Flat primary schools of Western Cape. These include poor infrastructure, lack of support, lack of training and theft to name but a few. These reasons are discussed in more detail below.

5.2.1. Teacher familiarity with the integration of instructional technology

This theme focused on teacher's familiarity with the use of instructional technology for pedagogy. The aim was to determine if teachers had been exposed to teaching with instructional technology, either during teacher training or at their current or previous workplaces. It was also highlighted in the findings that teachers' familiarity with ICT was very influential regarding their decision to utilise instructional technology for curriculum delivery. The older teachers, as shown in the findings were not trained to integrate instructional technology for pedagogy during teacher training. This was because 20 or 30 years ago computers technology in education was not yet a prominent phenomenon. . This then meant they graduated without being exposed to computers or any instructional technology. Most of these teachers only started getting exposed to instructional technology recently when it started infiltrating the educational sphere. This then meant these teachers had to learn about instructional technology on the job. Having gone so long without being exposed to this technology in their practice made some of the teachers reluctant to learn something new even though they were aware of the educational benefits these technologies had.

Another factor that compounded teacher reluctance in technology integration was the issue of inadequate training provided to them, it was not enough training to bring them to a level of being confident and fully competent in utilising the technology. Despite teachers receiving training on how to use instructional technology with the launch of the Khanya project, the findings seemed to show that the workshops were neither in depth nor specific to the subject matter. This resulted in many teachers having low self-efficacy when it came to the use of instructional technology. Many still felt they needed more training. Younger teachers were more open to using instructional technology due to them having received training on how to use the apparatus during teacher training. However, receiving training alone did not mean teachers would use instructional technology in their classes as was reported in the findings. Integration of instructional technology was influenced by a various set of factors, which included but not limited proper technical support, availability, maintenance and security of these resources.

Incompetency in instructional technology integration was partly influenced by the way educators were taught by their lecturers during teacher training. The ultimate effect of this was poor technological knowledge, technological content knowledge, technological pedagogical knowledge and technological pedagogical content knowledge. In order to improve their competency with integrating these technologies teachers needed more hands-on experience during teacher training. Therefore, it is relevant for teacher training programmes to prioritise the implementation of effective training for pre-service teachers. After teachers are qualified there must be mandatory workshops that keep teachers up to date with what is happening in the instructional technology field and train teachers on how best to use these new developments to equip learners.

None of the teachers was in possession of TPACK. None of the teachers from the observations conducted could seamlessly integrate instructional technology in a way that showed the teachers possessed all 7 constructs of the TPACK framework. Due to the lack of technology know how, these teachers may have had PCK but the technological component relevant for 21st century teaching outcomes was vastly inadequate. Basing again on the poor training regarding ET, many teachers were found lacking concerning TK, TPK, TCK and TPACK. As such, in order to have full-fledged teachers who possess TPACK there is a need to focus on professional development on technology use and integration. It is therefore, to the researcher's contention that

that teachers need to be furnished with skills that would enable them to combine the 7 constructs of the TPACK framework which are necessary for the effective integration and use of instructional technology.

It is therefore the researcher's conclusion that teacher familiarity to instructional technology influences teacher integration of instructional technology for pedagogy. Exposing teachers to technology makes them comfortable around it and when it comes to the classroom, they will be confident to integrate instructional technology in their teaching practice. There is need to train teachers regularly so those without prior experience with instructional technology can be given a chance to start learning.

5.2.2. Teacher challenges with the integration of instructional technology

Teachers face many challenges with integrating instructional technology for pedagogy. Challenges ranged from poor infrastructure, lack of support to the teachers, lack of training to integrate instructional technology and low technological efficacy. Poor infrastructure included lack of instructional technology apparatus due to financial problems, theft and erratic Wi-Fi connection. These difficulties made teachers to neglect the use of instructional technology and use the traditional teaching methods that did not need any technical support. Chigona and Chigona (2010) also discovered that teachers who were supposed to be using instructional technology did not have enough technical support to help them in their integration. When teachers needed technical help, the technicians delayed coming leaving teachers waiting for them to show up (Chigona and Chigona, 2010). This affected teacher's enthusiasm in integrating instructional technology. Hayes (2005) argued that there was need for principals to provide support to teachers by putting measures for professional development in place.

The issue of inadequate and viable resources also plagued the schools in this study. Some schools simply did not have a strong enough Wi-Fi connection meaning you need to be at a certain range from the office to get a connection. This meant teachers who had classes further away from the offices could not utilise the Wi-Fi during their lessons. This gave teachers extra work of pre-downloading material, and this extra effort discouraged some teachers from using this technology to be an integral part of their curriculum delivery.

Another barrier that came up was there was no structure to effectively assist teachers who had any issues with the technological devices in their classrooms. When dealing with older teachers who are still novices with instructional technology integration, there is need for a strong support system which was unfortunately not present at these schools. Such situations discouraged teachers from integrating instructional technology for pedagogy. There is a need to address these barriers if Cape Flats primary schools are to have teachers who are in possession of TPACK. Other external factors include the absence of support from the schools when it comes to matters that deal with integrating instructional technology in the classroom (Neyland, 2011). Against this backdrop Buabeng-Andoh (2012) argued that in order to have successful integration of instructional technology institutions must have strong school programs that offer support to teachers.

It is evident from the results obtained in this study that many of the educators in the sampled public schools had limited, and in some cases, non-existent abilities to integrate instructional technology in their classes. The observations and interviews showed that many of the teachers were at the entry stage, which according to Omariba (2012) shows teachers' abilities to use instructional technology as being limited to using instructional technology for interaction. It was therefore very clear from the findings that despite teachers' understanding and appreciation of the value that ICT posits, the reality on the ground is that there are many challenges faced by these teachers that are putting a dent in their ability to integrate instructional technology for curriculum delivery.

Observations were explicit in showing that there is a long way to go before full instructional technology integration can be realised. Due to the lack of instructional technology devices and teacher inability to operate instructional technology, the researcher observed there is a need for many structures to be put in place to facilitate integration. Teachers need support in terms of training and technical support. There is need for schools to tackle these issues from a policy point of view, which would direct the ICT plan and implementation to ensure ongoing development and integration.

It is therefore the researcher's conclusion that the many challenges teachers face, influences the decision of whether they integrate instructional technology or not. When instructional technology integration for pedagogy is surrounded by many problems,

these problems act as hindrances for teachers to integrate instructional technology for curriculum delivery. There is a need to address these barriers if we are to experience full integration of instructional technology in classroom of primary schools in the Western Cape. Schools must have effective ICT support structures to help teachers with any instructional technology related challenges. Schools must be financially assisted so they can increase their Wi-Fi reliability and strength. Safety measures must be implemented to safeguard the instructional technology already at these schools. Once these concerns are addressed an environment that encourages the adoption of instructional technology will be created, and the uptake of instructional technology integration will surely increase.

It has been concluded from the findings that these challenges do affect the integration of instructional technology for pedagogy. These challenges affect integration independently and combined. Therefore, solving one challenge does not necessarily mean integration will increase. You may provide support structures to ICT problems but if instructional technology devices are not available no integration will take place. All challenges experienced by teachers need to be dealt with, and in so doing an environment that encourages the integration of instructional technology for pedagogy will be created.

5.2.3. Advantages of integration of instructional technology for curriculum delivery

It is paramount to point out that the researcher found out that all participants in this study were of the opinion that instructional technology had a very big role to play in the classroom. Despite some teachers not being enthusiastic to the integration of instructional technology in their curriculum delivery, they were all in agreement when describing the benefits that instructional technology had over traditional teaching. Some of the benefits that teachers described included the ability of technology to save time since all teachers agreed the curriculum was packed and left no breathing space. Teachers also agreed that that technology had the ability to change the way information was presented and allowed for different media like videos to be played in order to provide learners with a different perspective. Therefore, all teachers agreed on the importance of instructional technology in the classroom and agreed it had the potential to simplify their lives.

However, even considering such positive remarks on the use of instructional technology some teachers still did not use instructional technology in their classrooms. The reasons differed from teacher to teacher but after the analysis of present data the researcher concluded that there was not one factor that individually affected the integration of instructional technology in the classroom. The integration of instructional technology by teachers was influenced by a number of reasons, and it was a combination of these that was the main cause behind the lack of integration of instructional technology by some teachers. Tondeur et al. (2016) suggested that schools with structures like policy planning, instructional technology support and peer support have a positive effect towards teachers integrating instructional technology in their classrooms.

It is the researcher's conclusion that all teachers were of the opinion that instructional technology was very beneficial for pedagogy. It provided ease in doing tasks and allowed for learning to be extended beyond the classroom. Teachers, however require adequate training and support for implementation. need the factors mentioned prior to fully integrate instructional technology as they are fully aware of the advantage's instructional technology poses.

5.3. Recommendations

Looking at the findings this study has dictated, the following recommendations may be put forward to ensure the integration of instructional technologies in classrooms in primary schools in the Cape Flats. There is a need to encourage the integration of instructional technology cape flats primary schools in the Western Cape and to increase efforts that encourage the development of TPACK. Teachers need to be provided with more ways to gain knowledge of how to integrate instructional technology into their classrooms. It should also be encouraged that teachers design lessons that integrate instructional technology, then present these lessons to their colleagues before teaching students. Feedback from their colleagues must be given in a friendly environment to encourage teachers with low integration efficacy to feel confident enough to try and use instructional technology in their classrooms. This method would prove reliable as critiques from their peers would help teachers to fix their mistakes and perfect how they use instructional technology in their classes before they actually

teach the learners. Critiques from colleagues is a reliable means to encourage successful teachers' development of TPACK.

It was found out from this study that though teachers had undergone training on how to integrate instructional technology in their classrooms for pedagogy they were not competent enough when it came day to day application. Thus, further training sessions must be conducted on regular intervals to encourage teachers to keep abreast with technological updates and to train teachers to be in possession of TPACK. Regarding the training conducted by the WCED it came out during interviews that it was generic and needed more emphasis on being particular to didactics instead of being generalised. When teachers are trained on how to use instructional technology for their subject matter, it will encourage more and more teachers to want to use ET and this aids in the development of their TPACK.

When attempting to increase the integration of instructional technology it is very important to note that there is no integration without the availability and accessibility of instructional technology apparatus. There has to be adequate instructional technology in the school, and it must be functioning optimally and well managed. Teachers' motivation to integrate technology with pedagogy and content can be enhanced by the presence of different learning support technology. Several teachers complained of erratic and slow Wi-Fi connections. This acts as a detriment to teachers' desire to integrate instructional technology. When installing Wi-Fi connections, the WCED must make sure the Wi-Fi covers the whole school, and that it has steady signal strength with acceptable internet connection speeds. Just having structures like this working optimally facilitates a continuous culture of technology enhanced lesson deliveries. Another critical component to note is that the development of TK, PK and CK and the relationship between PCK, TCK and TPK to form TPACK requires ET apparatus to be available. Of utmost importance is teachers' motivation to integrate the three components. Leendertz (2013) suggests that the role instructional technology plays in a classroom is strongly linked with teacher's belief about the nature of teaching and learning. So, this shows that teachers must be motivated to use instructional technology, they must see the benefits instructional technology posits, and an environment that encourages them to use instructional technology must be created. Teachers must be motivated to integrate instructional technology in their curriculum delivery and only then can they develop TPACK.

5.4. The researchers' final remarks

The integration of instructional technology in classrooms of Cape Flats primary schools in South Africa has the potential to promote effective curriculum delivery. This is important in schools that have limited resources and have a track record of learners performing poorly. The researcher is convinced beyond doubt that for the integration of instructional technology gain traction, it is very important that all stakeholders identify challenges that discourage teachers from integrating instructional technology, and put measures to address the shortcomings. At the same time, it is very important to identify aspects that encourage teachers to use instructional technology so that an environment that encourages the integration may be made prevalent in more of these schools. As has been identified in this study, it is usually a combination of factors that dissuade teachers from using instructional technology thus it is of the most importance that these be addressed collectively. It is very important that schools have functioning ICT committees as the findings pointed out that many teachers view instructional technology in a positive light but have poor self-efficacy as such the ICT committee can go some way in addressing that issue.

In conclusion, this study used a small sample of teachers from two Cape Flats primary schools. It used interviews and observations as data collection instruments. Another study with a sample of students and more teachers from various schools is needed. This will ensure a more in-depth picture on what hinders and what promotes instructional technology integration in classrooms. A larger sample will in turn provide a better opportunity for instituting a connection between TPACK and technological skills, TPACK and technological tools and TPACK and teachers' readiness to use instructional technology. The proposed study should incorporate teachers, school administrators, ICT support team and students.

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APPENDIX A: Interview schedule: Data collection instrument 1

This interview schedule is for educators and is aimed at establishing challenges that affect in-service teachers' integration of instructional technology into pedagogy in Cape Flats primary schools in the Western Cape Town.

1. Do you have enough technical skill to use technology in your class?
 - If yes, do you utilise technologies in your pedagogy
 - If not, why don't you
 - What factors influence your willingness to Integrate technology in classrooms?
2. Were you taught how to integrate technology into your teaching?
3. What technologies are at your disposal and how often do you use them and why?
4. Are there provisions for professional development regarding teaching with technologies considering the pace at which technologies are changing?
 - If so, what are they? How have you benefited from them?
 - If not, how do you keep up with the constant changes in technology on a personal level?
5. What are you doing individually for your own personal development on technology integration?
6. Do you consider technology in the classroom as a necessity for learner achievement?
 - If yes how so, if not please clarify why not
7. Do you know how to adapt technologies in the classroom in a way that you enhance what you teach, how you teach and what students learn?
 - If yes how do you utilise the technologies
8. How long have you been teaching and which grades can you teach?
9. How do you decide which teaching method goes with a particular topic?
 - Do you change the teaching method depending on the content you are teaching?
 - What decision do you go through when deciding which content goes with this teaching method, walk me through the process
10. Are you a teacher by profession?
 - Do you think technology is important in teaching, if so why, if not why not?
 - What advantages do you think technology in mathematics possess for the learner?
11. Do you think that your lessons are enhanced by the integration of technology?
 - If yes please explain

If not, please explain

12. Can you describe how the learners are engaged when your lessons are supported by technology?

Do you feel technology makes learners more engaged in the learning process?

APPENDIX B: Observation Schedule

Observation Schedule	
Date of observation:	<div style="display: flex; justify-content: space-between;"> ___ / ___ / 2020 ___ Observer: Researcher </div>
Time of observation	
Lesson observed	
Observation Length	
Grade:	ESL Grade Classroom
Description of school	

Lack of support from the school authorities in purchasing instructional technology

There is unreliable electricity:

Lack of knowledge in the use of some resources:

There are insufficient computers :

There is lack of technical assistance:

There is over-enrolment of students in our School:

Additional information and reflective notes

APPENDIX C: Cape Peninsula University of Technology: Research Ethics Clearance Certificate



<i>*** For office use only</i>	
Date submitted	29/5/2019
Meeting date	28/8/2019
Approval	P/Y/N
Ethical Clearance number	EFEC 3-8/2019

FACULTY OF EDUCATION

RESEARCH ETHICS CLEARANCE CERTIFICATE

This certificate is issued by the Education Faculty Ethics Committee (EFEC) at Cape Peninsula University of Technology to the applicant/s whose details appear below.

1. Applicant and project details (Applicant to complete this section of the certificate and submit with application as a Word document)

Name(s) of applicant(s):	Xolile Mdingi
Project/study Title:	Factors influencing in-service teachers' integration of instructional technology into curriculum delivery at primary schools in the Cape Flats
Is this a staff research project, i.e. not for degree purposes?	Masters in education
If for degree purposes the degree is indicated:	Masters in education
If for degree purposes, the proposal has been approved by the FRC	Yes
Funding sources:	None

2. Remarks by Education Faculty Ethics Committee:

Ethics clearance granted from 1/9/2019 – 30/12/2023		
Approved: X	Referred back:	Approved subject to adaptations:
Chairperson Name: Dr Candice Livingston	Chairperson Signature:	Date: 28/8/2019
Approval Certificate/Reference:		

EFEC Form V3_updated 2016

APPENDIX D: WCED research approval letter



Directorate: Research

Audrey.wynngaard@westerncape.gov.za
tel: +27 021 467 9272
Fax: 0865902282
Private Bag x9114, Cape Town, 8000
wced.wcape.gov.za

REFERENCE: 20191017-536
ENQUIRIES: Dr A T Wyngaard

Mr Xolile Mdingi
B364 Luleka Street
Khayelitsha
7784

Dear Mr Xolile Mdingi

RESEARCH PROPOSAL: IN-SERVICE TEACHERS' INTEGRATION OF INSTRUCTIONAL TECHNOLOGY INTO CURRICULUM DELIVERY AT PRIMARY SCHOOLS ON THE CAPE FLATS

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from 20 January 2020 till 18 September 2020
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number?
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:
**The Director: Research Services
Western Cape Education Department
Private Bag X9114
CAPE TOWN
8000**

We wish you success in your research.

Kind regards,
Signed: Dr Audrey T Wyngaard
Directorate: Research
DATE: 17 October 2019

Lower Parliament Street, Cape Town, 8001
tel: +27 21 467 9272 fax: 0865902282
Safe Schools: 0800 45 46 47

Private Bag X9114, Cape Town, 8000
Employment and salary enquiries: 0861 92 33 22
www.westerncape.gov.za

APPENDIX E: Permission letter from principal to conduct research at a school

Mr. Xolile Mdingi
B364 Luleka Street
Khayelitsha
7784
Cell no: 0786909167

Dear Mr/Mrs/MS

Permission to observe and interview your Teachers for my CPUT Master's thesis
I am currently affiliated with Cape Peninsula University of Technology where I am doing my Master's degree. My research topic is:

"In-service teachers' integration of instructional technology into curriculum delivery at primary schools on the Cape Flats".

I would like to obtain your permission to observe and interview your teachers at a time that is convenient to them. My role will be to observe classes and to interview teachers about their opinion on technology integration in classrooms. I will not in any way disrupt their day-to-day duties.

I will require you and the educators, to sign this letter of consent which gives me your permission to continue with this research. My research plan is to observe and interview the teachers between the 20th of January 2020 and the 18 of September 2020.

All the information obtained from my observation and interviews will be kept strictly confidential and that the above arrangement can be terminated at any time. The research project, when completed, will be available for you to view. Please note that the names of the participants will be kept anonymous. Please feel free to contact me if you need any additional information regarding this research proposal.

Yours Sincerely

I Mr/Mrs/Ms.....give Xolile,Mdingi,permission to observe and interview educators for his CPUT Master's thesis.