CHALLENGES IN THE ADOPTION OF INFORMATION AND COMMUNICATION TECHNOLOGY AT SELECTED SCHOOLS IN THE MPUMALANGA PROVINCE

by

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Challenges in the adoption of information and communication technology at selected schools in the Mpumalanga Province

I declare that the above dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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

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

_____   19 May 2023

SIGNATURE   DATE

ACKNOWLEDGEMENTS

DEDICATION

This thesis is dedicated to my late parents, Edgar Solly Ngobe and Sibongile Mashele, who always took great pride in all my accomplishments. They would have been extremely proud if they had the chance to see this effort finished.

ABSTRACT

Education is considered a weapon to fight poverty in developing nations including African nations. South Africa, Mpumalanga is not left behind as the use of Information and Communication Technology (ICT) during COVID-19 was compulsory despite limitations brought about by economic disadvantages. Several studies have argued that in the information era, the use of modern technologies in education is pivotal. The implementation of ICT into teaching and learning expands opportunities for teachers and students to work more collaboratively and effectively in the digital age and it also helps in developing human capital. The recent global crisis known as COVID-19 has brought learners outside the school during the pandemic and in order to get the curriculum completed there was a need to adapt and to integrate ICT in teaching and learning. Hence, in most nations they attempt to catch up with technological progress and digitise their educational system, but still fail due to some issues that hamper the process of ICT integration in education. The main focus of this study is on challenges in the adoption of ICT at the selected school in the Mpumalanga Province, South Africa. To be more specific, this study aims at identifying and describing the challenges encountered by schools in Bushbuckridge Bohlabela District in the adoption and using of ICTs so that remedial actions can be proposed to address such defies. I drew on the Technological Pedagogical Content Knowledge (TPCK) to understand the barriers that affect the successful ICT adoption in schools. The framework was used as a lens to describe the kinds of knowledge required by teachers for the effective incorporation of technology in teaching. It suggests that teachers need to master the connections of technology, pedagogy and the content. A total of twenty teachers from five public primary and secondary schools have been purposefully selected to participate on this qualitative study. Data was collected using interviews and observation. I followed a

thematic analysing method when analysing data. The findings of the study show various factors that affect the adoption of ICT in Bushbuckridge schools. They mentioned lack of digital infrastructure and facilities, lack of technological knowledge, insufficient ICT training, lack of support from school governing board and School Management Team, absence of time and lack of ICT policy as factors that hinder the successful ICT adoption in schools. Therefore, it is recommended that schools should consider aspects of ICT adoption, particularly from a Management and School Governing Bodies (SGB) perspective, such as strategic planning, controlling and policy. Government as well should provide essential ICT tools for schools in the country and to determine what types of training teachers need before they are selected to go on training.

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LIST OF ACRONYMS

ACE   Advanced Certificate in Education

CK   Content Knowledge

DBE   Department of Basic Education

DoE   Department of Education

HOD   Heads of departments

ICT   Information and Communication Technology

IEEM   Industrial Engineering and Engineering Management

IT   Information Technology

MoE   Ministry of Education

NDP   National Development Plan

PCK   Pedagogical Content Knowledge

PGCE   Post Graduate Certificate in Education

PK   Pedagogical Knowledge

SGB   School Governing Bodies

SMT   School Management Team

TK   Technological Knowledge

TPACK   Technological Pedagogical Content Knowledge

TPCK   Technological Pedagogical Content Knowledge

UNISA   University of South Africa

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Information and Communication Technology (ICT) has increasingly become part of our everyday lives, especially in the current education system. Many countries perceive ICT as a potential tool for transforming the educational system. UNESCO (2010) defines ICT as a technology used to process, share, transfer and store data as well as exchange information. According to Yusuf (2007, p. 1), ICT is "an electronic technology used for accessing, processing, gathering, manipulating, presenting and communicating information". He also expands by stating that ICT may be viewed as a combination of informatics technology with other related technology. Separated from instructors' need of capacity and state of mind towards ICT use, not having ICT tool and infrastructure is still a major barrier in many developing communities (Adarkwah, 2021) such as South Africa.

As countries are in the era of the 4th Industrial Revolution, it is a widely accepted that every modern society views education as its pillar and the socioeconomic progress of countries is significantly influenced by its quality of educational system. Hence, learning and teaching in the modern day is not confined to a classroom. At primary, secondary and tertiary education levels, ICT is considered a significant component of educational reforms and innovations (Mondal & Roy, 2010).

On the other hand, the social, environmental and geo-political factors have affirmed and accelerated the adoption of learning and teaching methods other than the face-to-face modality. The Coronavirus (COVID-19) is one example of the environmental factors that have affected societies at large as well as the education sector worldwide.

Its impact resulted in the temporary closure of the entire education sector (primary and secondary schools and tertiary institutions). Such disruption had an impact on the way societies' functioned and communicated. To keep education operational, educational institutions had to come up with concrete plans to adapt to the situation caused by COVID-19 and operate under it as a new normal. During the year 2020, most learners and teachers globally could not continue with traditional face-to-face learning and teaching. During this time, ICT played a pivotal role as teaching and learning was conducted on digital platforms. In this regard, ICT became more important than ever before in education systems.

This qualitative study addresses the implications of the challenges of ICT encountered by Bushbuckridge area schools in Mpumalanga Province, South Africa when implementing and using ICT in teaching and learning. The study was conducted in primary and secondary schools in the Bushbuckridge area under the Bohlabela District. The study was conceptualised because of the challenges the principal investigator had experienced during her teaching practice and the struggles faced by other educators in various schools. Chouthaiwale and Alkamel (2018) suggest that ICT tools have become one of the fundamental building blocks of modern society. These ICT tools must also be included during teaching processes which would result in a change in learners' attitudes and pedagogical behaviours and motivate them. To meet the needs of their students, teachers must adjust and adapt because of these ICT tools.

Morris (2019) asserts that ICT has the potential to meet the students' learning needs and motivate them, promote independent learning among students, engage students

and help them become learner-centred in the learning process and become critical thinkers.

Consequently, some teachers are facilitating teaching and learning using alternative pedagogies such as Microsoft Teams, Zoom, Skype, Moodle, Google Classroom and various social media platforms, such as WhatsApp and Facebook to achieve the desired learning outcomes. Conversely, few schools use ICT meaningfully and effectively to achieve the learning outcomes. Some schools, especially in rural settings, do not have the infrastructure to benefit from the capabilities and affordances of ICT. Ferri et al. (2020) assert that even though educators seem to value the importance of ICT in schools, they encounter obstacles that prevent them from using ICT in the classroom for learning.

Many rural schools in South Africa exist below the poverty line and continue to be poverty-stricken and do not have access to the basic infrastructure necessary to adopt ICT in teaching and learning (du Plessis & Mestry, 2019). The Covid-19 pandemic compounded this situation. Amnesty International (2020, p. 15) summarises the impact of COVID-19 in education as a "broken and unequal education system":

> A child's experience of education in South Africa depends on where they are born, how wealthy they are, and the colour of their skin. The COVID-19 pandemic has made a broken and unequal system even worse, putting student from poorer communities at a huge disadvantage. Remote learning is not an option for the vast majority.

Therefore, there is a need to capacitate teachers and learners, particularly in primary and secondary schools on the use of ICTs. Also, there is a need to propose solutions to assist those schools which do not have the necessary resources to adopt ICTs. Furthermore, those proposals must be implemented in order to transform the

education system because there is no more turning back to traditional ways of learning and teaching. The ICTs have penetrated and reformed many aspects of our lives such that we now live in a world dominated by consumer-driven technology (Iyer, 2022). Undoubtably, it is an integral part of our lives today will remain so, no matter how we feel about it. Therefore, educators and pupils in primary and secondary schools need to familiarise themselves with 21st century learning skills.

1.2 Rationale of the Study

Despite efforts that educators make towards the use of ICTs, there is a lack of direction about how they might best be integrated or implemented in Bushbuckridge schools. According to Vallance (2009), education reforms that promote the use of ICTs lack a solid grounding or rationale for their implementation. As a high school educator in the rural area, I have observed that the adoption of ICTs in most schools does not meet the desired outcomes because in many instances, even if the Department of Education (DoE) purchases the ICT infrastructure, these resources remain unused or underused at some schools due to a lack of technical skills, e.g., computer skills. It was observed during the national lockdown that some schools were vandalised and ICT infrastructure was stolen. More than 72 schools in the Mpumalanga Province were broken into (Marhule, 2020). Hence, robbery and vandalism also emerged as the main challenge for successful implementation of ICT in teaching and learning. Moreover, even if teachers want to improvise from home by bringing in ICTs in the classroom, most learners come from poor backgrounds with illiterate parents and do not have adequate computer centres in their community; therefore, it becomes a challenge for some of the learners.

1.3 Problem Statement

Mogwe et al. (2020, p. 218) highlight the "lack of teacher reliance, teacher competency and constructive training programmes; the resistance to change and negative attitudes towards ICT usage; the lack of technical support and infrastructure" as the common obstacles to successful ICT integration. Although ICTs have the potential to transform the education system to a great degree, this is not the case in some of the developing countries because of systemic and structural challenges. This study was prompted by the escalation of the challenges educators and pupils face when adopting or using ICTs in rural schools. The study identified that a lack of digital infrastructure and facilities, obstacles in the adoption of ICTs in teaching and learning, teacher's pedagogical content knowledge\beliefs, the importance of ICT in Bushbuckridge school and the support from the Department of Basic Education (DBE) need to be addressed in relation to ICT adoption and intervention strategies deployed to address them.

During the pandemic, teaching and learning depended more on digital technologies and digital learning to complete the curriculum. However, this affected most schools because they were unable to adapt to the use of ICTs in teaching and learning due to various challenges they faced in their schools when adopting them during teaching and learning. The following has been highlighted as being the major challenges faced by schools for successful ICT adoption: lack of ICT equipment, poor internet connectivity, lack of technical support, negative attitudes towards ICT usage, limited skilled resources and lack of supportive infrastructure (Muleya et al., 2021). Although ICTs have the ability to significantly advance the educational system, this is not always the case in rural areas due to a lack of infrastructure and basic resources. Therefore,

this study wanted to address these challenges for successful integration of ICTs in Bohlabela District schools.

1.4 Purpose of the Study

The purpose of the study was to identify and describe the challenges encountered by schools in the Mpumalanga Province in adopting and using ICTs so that remedial actions could be proposed to address such challenges.

1.4.1 Research question

The main research question for the study is:

- What are the challenges encountered by Mpumalanga schools in the adoption of Information and Communication Technology?

The secondary research questions are:

- What are the infrastructure-related challenges in ICT-enhanced education in Bushbuckridge schools?

- How does failure to adopt ICTs impact teaching and learning in Bushbuckridge schools?

- To what extent do teachers use ICT in teaching and learning in classrooms?

- How can the use of ICTs be improved in Bushbuckridge schools?

- What pedagogical content knowledge must the teachers have in order to adapt ICTs in the classroom?

1.4.2 Research objectives

The research objectives were:

- To determine the infrastructure-related challenges when using ICTs in Bushbuckridge schools.

- To determine the challenges of using ICTs in teaching and learning in the classroom among schoolteachers.

- To identify the extent teachers use ICTs in teaching and learning in the classroom.

- To explore the improvement of ICT use in Bushbuckridge schools.

- To provide recommendations on how the Bohlabela District can distribute devices to equitably enhance ICT use in schools.

1.5 Theoretical Framework

This study attempted to address the challenges confronting the schools in Bushbuckridge when applying ICTs in teaching and learning. It is significant to have a detailed theoretical and practical knowledge of structures and models to gain a proper understanding of the factors that encourage increased use of Information Technology (IT) (Maruping et al., 2017). Technological Pedagogical Content Knowledge (TPACK) was used as a lens to analyse and interpret data from the findings of the study.

Mishra and Koelher were the first to introduce the TPACK framework (2006). The framework is based on Shulman's (1987) Pedagogical Content Knowledge (PCK), which proposes that teachers' knowledge is more than just Content Knowledge and

general pedagogical principles. Shulman proposes that teachers have a unique type of knowledge that deals with processes and techniques for transforming content in pedagogically viable ways. The TPACK framework expanded PCK to include technological knowledge as an important component of the types of knowledge teachers must have, and, like PCK, TPACK is conceived of as more than individual pieces of knowledge.

The TPACK framework states that particular technological tools such as software, hardware and information literacy practices are best employed to train and direct students towards a deeper, more thorough comprehension of the subject matter, thus, under the TPACK framework, the three categories of knowledge – Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) are joined and reconfigured in different ways. Technical Content Knowledge describes connections and intersections between technology and learning objectives, whereas PCK describes connections and interactions between pedagogical methods and specific learning objectives. The Technical PK (TPK) outlines connections and points of contact between particular pedagogical approaches and technological tools. The TPACK, which considers the connections between all three regions and recognises that educators are functioning within this complex space, is then compromised of these triangulated areas.

The paragraphs below provide a brief description of these theories.

1.5.1 Technological Pedagogical Content Knowledge

Technological Pedagogical Content Knowledge (TPACK) was introduced by Koehler and Mishra in 2006. TPACK is a framework for understanding and describing the types of knowledge required for successful pedagogical practice in a technology enhanced learning environment by teachers. It looks at the connection between technology, pedagogy and content. According to Koehler and Mishra (2006), there is a basis for incorporating technology into the curriculum by addressing CK, PK, and TK concurrently.

Figure 1.1 below presents the TPACK which I consider a fundamental model for educators as they initiate digital tools and methods to support teaching and learning.
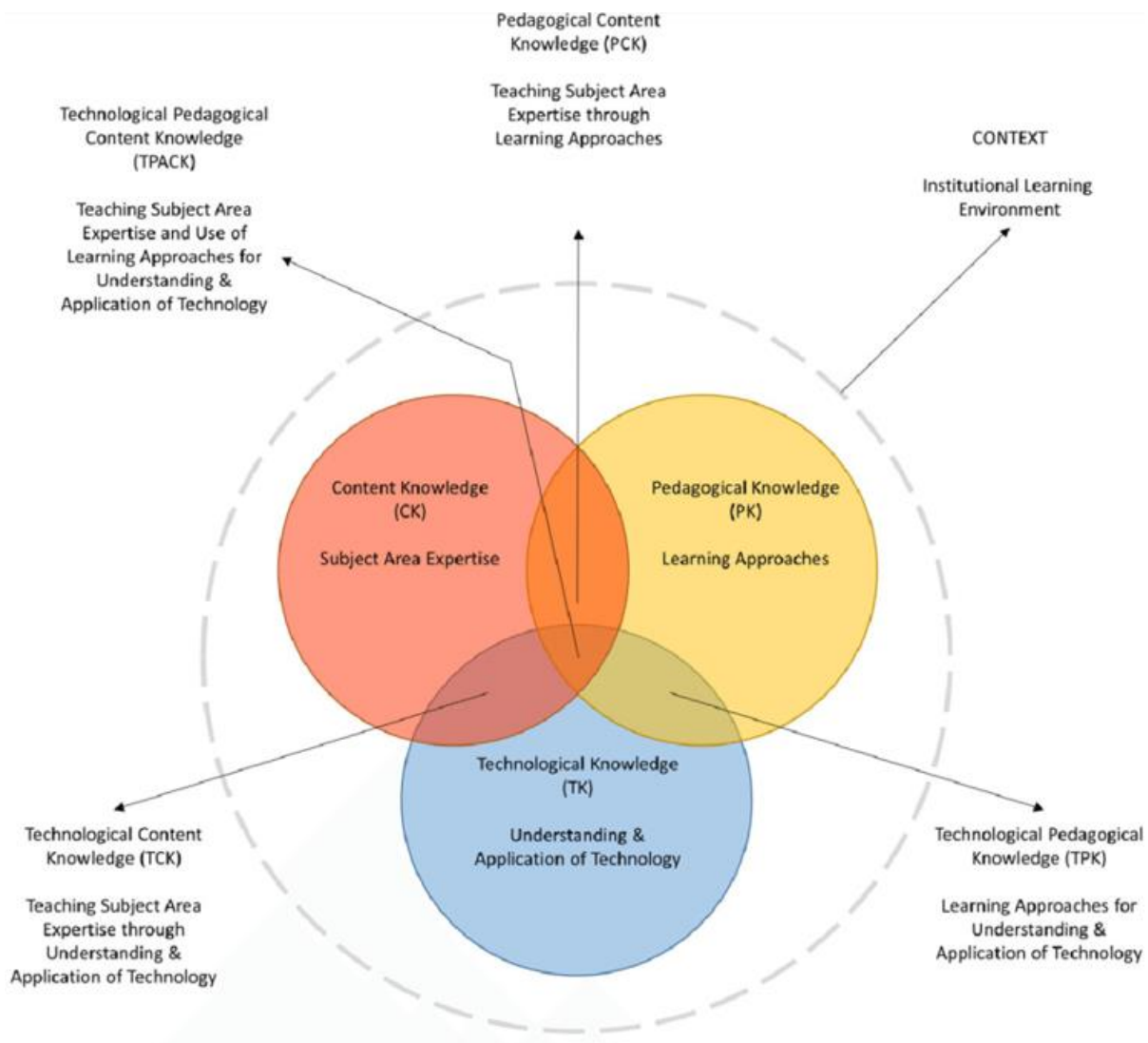
Figure 1.1: TPACK Model adapted from Koehler and Mishra (2006)

The understanding of how to teach with technology is represented in the middle of the diagram. This does not necessarily imply whether you know each of the key concepts individually. Understanding how to use technology to teach ideas in a way that improves student learning experiences is the goal of TPACK. The TPACK model is a structure for understanding the effect of integrating layers of TK and PCK in the classroom. During teaching, teachers combine their subject knowledge with their knowledge of other subject matter to employ appropriate instructional methods for their students (Shih & Chuang, 2013). Their use of PCK "reflects the way instructors

consider the connections between their subject matter and different instructional strategies" (Kushner, Susan, Benson, & Ward, 2013, p. 156). Through the integration of TK and PCK, teachers can adapt instructional methods and use various technological tools when delivering the content in a way that is meaningful to learners. In addition, TK and PCK relationships identify knowledge domains that characterise how teachers use technologies relative to teaching their subject matter and ways in which teachers use technological tools to encourage learners to have a will to learn.

The TPACK model, which handles the growing needs for technology in the classroom while keeping a focus on content and how it is taught, is the most important component of today's educational system. As a result, it enables future generations to be prepared within the educational system and also helps pupils get ready for the future. Based on the benefits embedded in this theory, this study adopted TPACK as its theoretical framework. The rationale for using TPACK is because it would help to deeply describe the challenges faced by schools when adopting Information Communication Technologies (ICTs). Therefore, it was used as a lens to describe and analyse these challenges.

1.6 Key Concepts and Conceptual Framework

Various concepts are clarified in this research to avoid the misconceptions that people may have. These terms are used because they are meaningful and relevant in the study. I believe that failure to understand any of these terms might result in misinterpretation of the study.

A conceptual framework is an analytical tool that is used to get a comprehensive understanding of a phenomenon. According to Maxwell (2013), conceptual and

theoretical frameworks are used interchangeably. The researcher builds the conceptual structure from personal experience, prior analysis and published theory into a coherent representation of the study (Maxwell, 2013). The key concepts and conceptual framework for this study are discussed below.

Pedagogical Knowledge is the knowledge that teachers need to have in the teaching process or curriculum, i.e., teaching methods, instructional designing of lesson planning, assessment of learners and knowledge about classroom management. In this study, educators must have a good grasp of PK so that when preparing a lesson that incorporates technology, they must select appropriate teaching strategies and design an authentic task that will be meaningful to learners. The seven roles of the teachers, i.e., CK, general PK, curriculum knowledge, PCK, knowledge of learners, knowledge of educational contexts and knowledge of educational aims, purposes and values are essential in PK (Shulman, 1987).

Content Knowledge is "the body of knowledge and information that teachers teach, and learners learn in the given subject" (Santos & Castro, 2021, n.p.). It is the knowledge about the subject matter or what is to be learnt in the classroom by pupils. Teachers must master their subject matter so that they can select appropriate teaching methods for their subject matter.

Technological Knowledge is the ability to know how to operate various technologies internal and external, such as computers, laptops, cell phones and emails. Educators must have capabilities in the use of technology. The lack of ICT knowledge may lead to inefficient use in the classroom.

Pedagogical Content Knowledge is the knowledge about the content that deals with the teaching process and the knowledge about the subject matter. It deals with the knowledge about how to use effective teaching methods in your subject area. Shulman (1986) defines PCK as teachers' interpretations and transformations of subject matter knowledge in the context of facilitating student learning. The PCK must be addressed in the context of diverse pedagogy.

Technological Pedagogical Knowledge refers to the knowledge of how different technologies such as computers, whiteboard, blackboard, cell phones, data, projectors, laptops and smart boards can be used in teaching and learning and understanding that implementing technology in the classrooms will require teachers to change from the old methods of teaching.

Content refers to everything included in the curriculum, namely the teaching methods, assessments, outcomes of the lessons, aims and values, classroom management, the programme of assessments and lesson planning. According to Shulman (1987), content is going beyond mere facts to include structures and relationships between concepts in a specific discipline. The PCK enables educators to apply their in-depth knowledge of the subject matter to their teaching practices.

Adoption refers to the acceptance, integration and ability to use new things. In this study, it refers to accepting the use of new technology in teaching and learning.

Communication refers to the way in which one interacts and exchanges information with others using technological tools such as emails, Facebook, Zoom, Teams, among others.

"Technology refers to methods, systems and devices which are the result of scientific knowledge being used for practical purposes" (Collins Dictionary, 2022). In the study it refers to the knowledge that is used in the classroom for teaching and learning.

Information Technology (IT) includes "building communication networks for a company, safeguarding data and information and creating and administering database" (Gershon, 2022, n.p.). In this study, it refers to telephones, radio equipment and personal computers.

1.7 Outline of the Dissertation

The outline of the study is as follows.

Chapter One: Introduction

In this chapter, I introduced the study, its aim and objectives, stated the research questions, described the significance of the study, gave the problem statement, described the study setting, discussed the theoretical framework underpinning the study, defined key concepts and the conceptual framework and presented the study outline.

Chapter Two: Literature Review

In this chapter I focus on a review of the relevant literature. I base my contextualisation within the South African educational system and global perspectives on ICT in education. An extensive literature analysis is conducted on the adoption and implementation of ICT in teaching and learning and lastly, the South African policy environment will be explained in more detail.

Chapter Three: Research Methodology

The research methodology, namely the design of the study, research paradigm, research type of strategy, the study sample, data collection, data analysis, reliability and validity, the ethical considerations and the limitations of the study are discussed.

Chapter Four: Findings and Discussion

The chapter reviews the results of the qualitative data. It details the findings and the interpretation of the results by providing a discussion in light of the findings collected from participants' responses. This chapter is organised into themes. It covers the following themes where the findings are discussed: lack of digital infrastructure and facilities, obstacles in the adoption of ICT in teaching and learning, teachers' pedagogical content knowledge/beliefs, the importance of ICT in Bushbuckridge schools and support from the DBE in relation to ICT adoption.

Chapter Five: Conclusion

This chapter is a summary of research findings, recommendations and suggestions for future research and the conclusion.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the related literature to the topic under study which is the challenges with ICT adoption in the South African education system. The chapter reviews the relevant literature that focuses mainly on the adoption, barriers, use, integration and implementation of ICTs in schools. The literature review is divided under the following topics, namely the use of ICTs in teaching and learning, adoption and implementation of ICTs for learning and teaching and international, national and local perspectives. The final section focuses on the South African policy environment with regard to ICT adoption in education.

2.2 The Use of ICTs in Teaching and Learning

The use of ICTs in teaching and learning provides numerous opportunities in this information age; to be more specific, during the Coronavirus (CoV) known as the COVID-19 pandemic it was observed that the use of ICTs addressed the issue of social exclusion in schools. For example, almost all learners from the primary to the tertiary sectors were not physically in schools and whether you came from a wealthy or poor neighbourhood, this disruption affected the learning process. Consequently, there was a need to introduce digital teaching and learning to complete the curriculum, even though it caused social exclusion in some schools. Hence, Singhavi et al. (2019) are of the view that technologies are reflected as imperative tools to create leaner-centred education and can support the closing of the digital divide between the different kinds of socioeconomic classes.

Du Plessis and Mestry (2019) are of the view that several factors contribute to the deprived quality of teaching and learning in rural South African schools. Hence, Rodny-Gumede (2019) supports this view when he states that South Africa does not have an educational system that encourages critical thinking, alteration and creativity. As far as I am concerned, the education environment affects the performance of students in schools. For example, learners in a poor learning environment without ICT infrastructure and incompetent teachers will tend to perform below expectations, while learners in urban areas in well-resourced learning environments with motivated teachers will perform better since their educational environment is more advanced – the teachers and learners often have more TK and technological tools. Therefore, it is strongly suggested that strategies be put in place to improve teachers' working conditions and learners' academic achievement in South African rural schools (du Plessis & Mestry, 2019).

The results of Katemba's (2020) study show that using technology in the classroom is helpful – about 93% of the questionnaire respondents showed that technology increased teachers' knowledge and skills as English teachers. The findings of the study also revealed that some teachers did not have knowledge on technological tools; hence, it was difficult for them to use ICTs in teaching and learning. As a result, it disadvantages learners from receiving the kind of education required in 21st century skills education.

According to Oja and Adu (2018) in their study conducted in the Eastern Cape Province, more than 70% of teachers lacked adequate knowledge and skills of ICTs and received ineffective management support. Moreover, in the study, it was recommended that there is a need for regular training for both teachers and learners

which would expose them to the relevance of the pedagogy related to the use of ICTs in teaching and learning. In addition, they highlighted that the management of the school should be seen providing and encouraging the efficient use of ICTs in the field.

Teaching and learning using digital and remote learning play a pivotal role in education. For example, using Microsoft Teams Zoom and Meet can allow learners and teachers to communicate and collaborate with one another while at home – it can also help students to become critical thinkers and to gain valuable access to information which is needed in the information age. Various studies reviewed the literature on the importance of ICT in education. It is stated that the use of ICT tools is significant in modern society – if all schools were to use ICTs in teaching and learning our education system would flourish and our country would have knowledgeable citizens if technological platforms were used in the classroom.

According to the study by Qaddumi et al. (2021), learners in Palestinian public schools observed that ICTs had an adequate influence on learning which contrasted with their teachers, who had a much stronger impression of the influence of ICTs on teaching and learning. In addition, Ghavifekr and Yulin (2021) argue that technology was critical to support teaching and learning during the COVID-19 pandemic. However, some unsatisfactory issues arose in the implementation process, such as teachers' mentality and economic level.

2.3 Adoption and Implementation of ICT for Learning and Teaching

Irrespective of the benefit and opportunities of ICT adoption in teaching and learning, there are various issues that hinder the effectiveness of ICT adoption and implementation in education during the COVID-19 pandemic. Rural schools were deprived of useful information on digital technologies which were essential during the COVID-19 lockdowns. Thus, I concur with the World Bank (2018), which found that the South African government faces challenges in providing quality education in rural areas (du Plessis & Mestry, 2019).

The adoption and implementation of ICTs when facilitating the process of teaching and learning could be delayed by a number of difficulties encountered by several schools, particularly in the era of COVID-19 where digital technologies appeared to be compulsory in most schools.

Previous related studies (see Alkinami, 2021; De-Graft Johnson, 2018; Raman & Yamat, 2014; Lawrence et al., 2018; Rana & Rana, 2020) have established the significant barriers faced by most rural schools in the adoption and implementation of ICTs in education. The researchers highlight the lack of ICT infrastructure, ICT knowledge, ICT training and the lack of time to implement ICTs in the classroom as factors that hamper the success of ICT adoption in education. In addition, the study finding of Mhlana and Moloi (2022) revealed the main factors that preclude ICT adoption in most rural schools which are demonstrated in Table 2.1 below.

Table 2.1: Main factors influencing ICT adoption

ICT infrastructure	Social influence
Past literature has argued that ICT infrastructure is a factor that foresees the adoption of modern technologies in teaching and learning. Lawrence et al. (2018) argue about the lack of access to technological tools/ICT infrastructure in schools. He highlighted that these affect the integration of ICTs during teaching and learning. Sometimes, schools might have all the necessary resources in place to support and facilitate digital technologies in school, only to find that teachers are unable to operate technological tools because they do not have basic TK; as a result, it affects the use of ICTs in rural schools.	The study of Mhlana and Moloi (2022) revealed that social influence was found to influence the adoption of ICTs in digital teaching and learning; for example, if learners and teachers believe important people around them use digital platforms, they might also be keen to use new technologies in their teaching and learning process. Consistently, Sumak et al. (2010) found that social influence plays a major role in the behaviour and attitude of both teachers and learners. The above discussion confirms that social influence has the greatest effect on the adoption of digital teaching and learning in education. As Nassar, Othman, and Nizah (2019) point out that social influence has a positive effect on the behavioural intention of ICT adoption.
Technical supports	**Access to resources**
Mhlana and Moloi (2020) note the technical support delivered in some schools has an influence on the adoption of ICTs in education. Schools need to develop teachers and learners in accordance with the TPACK framework. Numerous teachers are faced with challenges in the classroom when dealing with technological tools since they do not have knowledge of technological tools; hence, they require the presence of a technical person to assist them as soon as technical errors arise. Technical support is important before the provision of technological tools in schools so as to offer appropriate education on technical faults.	Hadzovic et al. (2022) suggest that ICT accessibility is the main factor in social and economic development. Several research studies (Ternenge et al. 2019, Adarkwah, M. A. 2021) indicated that lack of access to resources includes access to computers, lack of internet connection and electricity and insufficient software and hardware to operate. In general, you cannot implement or integrate ICTs in the classroom without access to technological resources. There must be proper investment in ICT resources provided by the government in South African schools.

A recent study by Aruleba et al. (2022) show three main factors that affect the adoption of ICTs in South African rural schools. They mentioned technology, socioeconomic status and politics as the main challenges for ICT adoption in schools. Similarly, SEACOM (2022, p. 33) indicates that in "South Africa and across the continent, digital innovation is driving social and economic change. Evolving connectivity on ICT is assisting South Africa in addressing its socioeconomic problems with regards to technologies". Meanwhile, the study conducted by Palvia et al. (2018) focused on sustain citizens view by relating technology driven with socioeconomic development in the developing countries.

Although there have been numerous studies in the field of ICT in education, very little empirical research has been conducted to investigate the adoption and implementation of ICT in the area of Bushbuckridge schools. Several studies (see Salloum et al., 2018; Panigrahi et al., 2018; Khatoony & Nezhadmehr, 2020; Rana & Rana, 2020) have been conducted on ICT adoption and integration in education and its challenges, contributions and benefits it has for our educational sector. Concerning ICT adoption in schools and education as a whole, it is imperative to attain the skills and be acquainted with the practicalities of new technologies (TK) so that it can be effectively used – being knowledgeable about modern technologies enhances teaching and learning if they are implemented appropriately.

Furthermore, teaching using ICTs is seen as a method that is in high demand, especially during the era of COVID-19, where everyone was facilitating teaching and learning using online platforms. Several studies (see Rana & Rana, 2020, Spiteri & Rundgren, 2018) have shown that ICTs in schools enhance the teaching and learning process, despite the challenges faced by rural primary and secondary schools in the

implementation process. A study conducted by Spiteri and Rundgren (2018) established that teachers' attitudes towards the use of digital technology in primary education were found to be related to teachers' confidence, skills, beliefs, self-efficacy and school culture, which were factors that encouraged/discouraged the primary school teachers from adopting digital technologies.

Furthermore, the assumption of Buda (2020) identified possible barriers which affect the adoption of ICT in schools and classified them into three groups, namely a lack of equipment, pedagogy and goals. Even though these factors hamper the use of ICTs in schools, they are important factors in improving the standard of teaching and learning and the barriers need to be addressed.

In addition, Salam et al. (2018) classified barriers into extrinsic impediments and intrinsic impediments. According to the study, extrinsic impediments are cited as lack of policy and planning, lack of training, lack of technical support, the cost of ICT infrastructure, internet issues and language issues. Intrinsic impediments are cited as lack of time, lack of PCK and TK, resistance to change and lack of accessibility. The case outcome of the study underpinned that intrinsic impediments are easier to overcome when the extrinsic impediments have been restrained effectively.

Similarly, Balanskat et al. (2006) classified ICT barriers into micro-level barriers which emphasise teachers' attitudes towards ICT use, miso-level barriers which emphasise educational institutions and macro-level barriers related to broader educational viewpoints. In general, all these factors could distract the adoption, implementation, integration and use of ICTs in most schools situated in rural areas like Mpumalanga Province. The research conducted by Keyembe and Nel (2019) is of the view that the South African educational sector faces a number of obstacles in the adoption of ICT in schools. They mention insufficient funding and infrastructure as barriers that affect the success of adopting modern technologies in the classroom; hence, in their study findings they recommended that the South African government should devote funding and policies for the improvement of infrastructure, technical support, financial capacity and human capabilities to develop the educational system for teachers and learners to contribute to the fourth industrial revolution (4IR).

In addition, adopting ICTs in education is a process that requires certain steps to be followed before incorporating them into our classrooms. It is against this background that before implementing ICTs in schools the following questions need to be taken into account: Will the school be able to provide the necessary implementation like a stable

internet connection; will the teachers be committed and comfortable to using eLearning in the classroom and transferring from the ordinary teaching approach; will parents also be comfortable with the change; will learners be provided with the necessary ICT tools; and will the government support the ICT implementation in schools?

2.3.1 International perspective

Global research has shown that ICT adoption can improve student learning and teaching methods. A report published by Ciroma (2014) on Japan's National Institute of Multimedia Education, for example, demonstrated that increasing student exposure to educational ICTs through curriculum integration has a significant and positive impact on student achievement, particularly in subjects like, math, science and English. Addressing lack of student access to technology to support teaching and learning requires meeting teacher technology requirements and providing digital tools (Korjuhina & Shamshina, 2018). Digital literacy is being built internationally through the integration of ICTs. Among the most common educational ICT applications are overhead projectors, laptops, computers and white boards. The inclusion of ICTs in basic and secondary school curricula has been emphasised by Malaysia's Ministry of Education (MoE).

In Malaysia's most recent Education BluePrint (PPPM) 2013–2025, the element of ICT has been incorporated as one of the transformation shifts of the national education future development emphasis. Through the document "Leverage ICT To Scale Up Quality Learning Across Malaysia", the government of Malaysia is committed to setting up and giving better internet accessibility by 2013, boosting online best practices content in 2013 by adding a video collection of the top instructors delivering classes in

important subjects and making the most of ICT for self-paced and remote learning to increase. The MoE of Malaysia (2013) have started introducing the ICT programmes to create interaction among students and improve accessibility to online resources for students who live in remote areas.

The UNESCO (2015) published a comparative analysis of e-readiness in sub-Saharan Africa that outlined the national status of ICT usage across the continent. It was observed that "Mauritius, Botswana, Namibia, Seychelles and South Africa are considered to be the highest-performing nations in terms of the number of learners in primary school who have access to television, radio and computers – a minimum of 60% across all these technologies" (UNESCO 2015, p. 7). Even though the study allows for the permanent existing problem of there being the absence of systematic data collection to measure the effect of ICTs in education across the sub-Saharan African nations (UNESCO 2015), the Institute for Statistics identified the collection of more and better quality statistics as a priority in the post-2015 development agenda (UNESCO 2015). This is in line with the view from the World Bank's (2012, p. 15) report on ICTs for Education in Africa, which identified an "absence of accurate, inclusive, up to date data on education" being recognised as one of the deficiencies across the continent.

Ghana's government has devoted itself to transforming the agrarian economy into an ICT- driven economy that creates information and knowledge. The government of Ghana has acknowledged the importance of ICT training and education in schools as well as the overall improvement of the education system. The integration of ICT into education will result in the creation of new opportunities for learners and teachers to engage in new knowledge acquisition and analysis. In addition, ICTs will improve the

quality of education delivery on an impartial basis. The Ghanaian government has created comprehensive programmes aimed at using ICTs in the education sector. This will help to transform the educational system and thus improve the lives of Ghanaians through the implementation and use of ICTs in education and to cater for creativity in order to meet the challenges of the 21st century (Ghana MoE, 2008).

According to Madlela and Ngakane (2022), the Kingdom of Swaziland recognises the importance of providing quality education to all citizens without discernment. The source of concern for the government of Eswatini and all parties involved is statistics showing that there are both young and adult Swaziland citizens who do not have access to quality education due to a lack of resources. They further highlighted that access to ICTs has created opportunities to investigate new methods of cultivating learners that focus on ICTs in education. However, the MoE and Training in Swaziland 2018 Policy revised does not recognise social platforms as effective platforms for teaching and learning using WhatsApp. The study findings of Rugube et al. (2020) indicate challenges with technology in education and proposes a model for the implementation of eLearning in Swaziland. They also recommend that a policy framework on ICT integration in teaching and learning should be established.

2.3.2 National perspective

According to the report from Trade and Industry (2021), South Africa has one of the largest ICT industries in Africa. It demonstrates technological foresight in the field of mobile software, security software and electronics services. The country's ICT and electronics sector is both sophisticated and developing, contributing significantly to South African gross domestic product. Microsoft and Systems Application ProtocolSAP have subsidiaries in South Africa that is viewed as a national crossroads

and a supply base for neighbouring countries. According to Mbanda and Fourie (2020), the government plans to train one million young people in robotics, artificial intelligence, coding, computing and networking through the use of various programmes and agencies to achieve South Africa's vision of 2030.

According to Communication Minister Khumbudzo Ntshavheni, major South African telecommunications companies are expected to speed up the implementation of new online systems at South African schools. A further 18 000 public schools are anticipated to be connected as part of the agreement, according to Ntshavheni, who spoke on March 23 at a Naspers summit. The government is working to secure the introduction of "minimum standards" for online school systems throughout the nation. All students in public schools will have email accounts with necessary security precautions and digital signatures, the official stated. As a result, teachers will be able to exchange instructional materials with students and some learning will be done online. However, to do this, eLearning content must be created in partnership with the DoE.

Likewise, basic education minister Angie Motshekga said in January 2022 that her ministry was working on a new framework to help regulate the rise of online schools in South Africa. The department has created a draft framework for the establishment of online education in schools. The minister of basic education indicated that the framework's purpose is to address the policy gap and provide guidance on the procedure for establishing an online school before it can be distributed to other stakeholders.

2.3.3 Local perspective

The Gauteng DoE has introduced online platform learning intended to improve paperless education in the province, changing the face of education in Gauteng. Leaners will have access to all of their study materials online and the ability to catch up on lessons while relaxing at their homes using online platforms such as computers and laptops. Moreover, the assessments that students write on the online platform can be automatically graded. The platform was introduced at Shoshanguve East secondary school, north of Pretoria, by Panyaza Lesufi, the former Minister of Education for Gauteng education. "We are not giving this online platform because we are bored, we are providing it to you because we want you to compete with the best kids everywhere in the globe and be among the best in the world".

According to the Western Cape DoE (2022), to guarantee that the province fully uses the potential of ICT in education, the Western Cape Education Department (WCED) is putting several strategies to ensure that province realises the importance of ICT in education. The WCED also concentrates on ICT use in schools to educate and help students; to boost the quality of instruction and learning in underprivileged schools; to encourage and aid instructors in closing the digital gap; to encourage students to participate in the global knowledge community; to encourage students to prepare for professions in the sciences, engineering and IT; and to ensure that curriculum and administrative information is available online and freely accessible to all schools in the province, urban and rural. The WCED is implementing the following eLearning strategies:

- Broadband WAN and Connectivity (Western Cape Government)
- The school-wide Local Area Network Wi-Fi and interconnection programme.

- Various "enabling environment" projects that will ensure the availability of digital toolkits and technologies for teaching and learning classroom integration.

- The Learning Management curriculum initiative is working to create new ways to use ICTs for curriculum development, delivery and support.

- Teacher Professional Development is increasingly being provided as online courses and mediated sessions as a result of collaboration.

As the province's eLearning initiative was introduced, Telkom joined with the Mpumalanga DoE as a mobile connection partner to help teachers and students in Grade 12 have faster access to online course materials. Telkom Consumer Chief Executive Officer (CEO) Lunga Siyo attended and supported the occasion on April 2022 at Ubuhlebuzile Secondary School in Piet Retief, Mpumalanga – thus, this gave teachers and learners in underserved areas access to online learning resources and allowed them to have virtual lessons. According to the reported news by Hanleigh 13 April 2022, Telkom is assisting the Mpumalanga DoE by offering data to teachers and learners. As part of this programme, the Mpumalanga DoE has given each learner a tablet and each teacher laptops that was pre-loaded with software and e-content and are data ready for online-offline teaching.

Precious Sambo (2018) conducted a study that investigated the information needs of rural communities in Bushbuckridge and highlighted their importance. She indicated that investing in information for communities is important since information plays a significant role in enabling communities to meet their development needs. The findings of the study revealed that to provide enough information about ICTs, library information services could assist, which would help in reducing the challenges of illiteracy, poverty and unemployment in the community of Bushbuckridge. In line with the findings, I think

adequate and effective distribution of ICT information can have a positive influence on teaching and learning.

In 2017, the Eastern Cape Province launched the teachers' laptop initiative, which provided laptops and data to teachers (George & Linden, 2017). In its initial phase, the initiative focused on Foundation Phase (Grade R–3) teachers. The initiative has reported challenges with a lack of training on ICT integration. Moletsane (2012) questioned why marginalised schools are still neglected 20 years after the end of South Africa's apartheid regime, which was blamed for the lack of resources and poverty.

Furthermore, at the Sekhukhune Technical and Vocational Education and Training College in Motetema, Limpopo, the ICT centre was opened on 1st of May 2021 by the Deputy Minister of Higher Education, Science and Innovation, Buti Manamela and the MTN foundation. He indicated that learners should have access to technological tools, computers and laptops to aid teaching and learning. He further mentioned that technology plays a significant role in ensuring that the department can provide teaching and learning to students wherever they were. The report Kagiso Moncho, regional manager for MTN Limpopo, stated that the establishment of this programme is completely dedicated to bringing the nation up to speed with technology. According to Moncho, "Our passion is to skill the pupils for the modern technologies and practical work experience".

2.4 South African Policy Environment

The implementation of ICT in any country incurs significant costs. Certain people take advantage of this opportunity to enrich themselves and their groups through

corruption. As a result of these unethical practices, the procurement of ICT facilities does not provide the country with the maximum benefits (Pratama, 2020). The UNESCO (2018) acknowledges that ICTs can be used to accelerate achievement of the Education 2030 Agenda targets by bringing together the perspectives of policymakers, academics and the private sector. This means that the government as the policymaker should provide financial support for schools to adequately provide ICT equipment needed in the schools, in addition to preparing the necessary facilities and infrastructure.

South Africa's 2004 White Paper on e-Education (RSA, 2004) set the goal of having every learner in the country ICT capable by 2013, as well as for teachers to use ICT to improve teaching and learning. This is one of the new administration's top priorities for South Africa's development strategy. The vision for the National Development Plan (NDP) 2030 was developed to enhance the standards in terms of education, development and innovation (National Planning Commission [NPC], 2012). The South African NDP outlines the government's commitment to creating a more inclusive society to reduce inequality by 2030. Its aim is the development of a dynamic and connected information society that is more inclusive and identifies the improvement of equality in public services to achieve this transformation.

Information and Communication Technologies can play an important role in achieving the objectives of the NDP. According to this plan, the government views ICT as a means to facilitate the inclusive socioeconomic transformation of South Africa. The National Integrated ICT Policy White Paper (RSA, 2016) includes policy interventions to address issues that affect the converged ICT; it extends existing strategies such as

South Africa Connect, National Broadband policy and the National Informational Society and Development Plan.

According to the National Integrated ICT Policy White Paper (RSA, 2016), the interventions address the infrastructure challenges in the ICT sector, including the education system. According to the Human Development Index in South Africa, the analysis of human development has shown that South Africa faces immense challenges related to inequalities in the standard of living, life expectancy and education; hence the use of ICT can play a pivotal role in addressing such challenges. The analysis of the report on approval of National Integrate ICT policy White paper also shows that South Africa's ICT sector has grown over the past decade compared to other nations.

Siyabonga Cwele, the former Minister of Telecommunications and Postal Services, in his meeting on the ICT Policy Review Recommendations and Implementation Plan (2015), stated that the policy aims to improve the white paper that was approved by the cabinet on September 2016 for crosscutting the ICT sector policy framework as required by industry and the NDP. He indicated that South Africa was the net importer of ICT products and the low supply of ICT skills hampers the growth of the ICT industry.

The NDP aims to address all these challenges. Mjwara, the chairperson of the ICT policy review panel, indicated that the National Integrated ICT Policy Green Paper (Department of Communications, 2014) must be developed in line with the Ministry of Environmental Affairs and other related departments. The Green ICT policy must support and recognise the role of technologies in combating environmental concerns in other sectors. Its main focus is on the ICT infrastructure and delivery of ICT facilities. Furthermore, Sizwe Snail ka Mtuze, another member of the ICT policy review panel,

focused on the digital society and understanding of ICT tools that facilitate social and economic development. The policy addressed the issues which influence the use of ICTs; references were made to highlight the importance of the discussion.

The ICT Policy in Education was developed in 1996 (RSA, 1996) and is entrenched within a broader national government economic, social and development strategy. The aim was devoted to a transformation policy on learning using ICTs in formal schools and FET sectors. In 2004, an educational white paper was developed to increase the quality of teaching and learning while using digital technologies (RSA, 2004). The goal of the policy was that every learner in primary and secondary schools should be ICT proficient. The South African e-Education policy documents outline partnerships with the regime and the private sector in the provision of ICTs in education to prepare primary and secondary schools for quality learning and teaching for 21st-century skills. The national digital and future skills strategy has been created by the department of digital technologies (DCDT) 2020.

According to the former minister of Communications and Digital Technologies Stella Ndabeni-Abrahams, this policy sets out a structured sequence of initiatives planned to contribute to the capacities of the South Africans in addressing the challenges of digital technologies in our society and increase adoption of digital technologies that brings virtual in the environment, the policy also aims to benefit people from South Africa with digital skills and in the creation of new types of 21st-century jobs. Moreover, the basic sector of education in collaboration with the department of telecommunications met to discuss the provisions of ICT connectivity in all South African schools.

The results of the report indicated that there was a strong focus on the preparation of teachers as one important process to incorporating technologies. They also indicated

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that the key challenges in implementing technologies were the issues of insufficient funds and the issue of infrastructure, and its functionality was found to be unsatisfactory.

Furthermore, the Deputy Minister of Basic Education Regianal Mhaule, in her speech on News 24 (2021), indicated that the DBE aims to improve technology use in all primary and secondary schools, so that the curriculum content in schools can be completed on time. She further stated that the DBE would do everything in its power to ensure that they use technology to help learners stay on track with their school work, to improve ICT adoption and infrastructure in the most remote rural areas where there is no network and also to help teachers communicate with learners even when they are at home. "We are making significant efforts to improve eLearning. We want to express our gratitude to all of the stakeholders who are helping us make eLearning a success. Due to a lack of connectivity in rural areas, we continue to have issues, but we are working with all service providers to improve ICT" Chief Director at DBE Mzwandile Matthews said.

According to Manda and Judy Backhouse (2017), South Africa's government approved a Cyber-security Policy Framework in 2015 to protect the country's information or communication data as well as its citizens from cyber-attacks. Despite this cyber-security legislative framework's inadequacy, in August 2005, a draft bill was later revised and published. It was introduced to parliament in February 2017. The draft bill has been debated as seriously jeopardizing constitutional rights, specifically, those concerning free expression and information as well as the right to privacy and the right to information from the public sector.

2.5 Summary

In this chapter, I presented some literature related to barriers in the adoption and implementation of ICTs in South African rural schools. Firstly, I discussed the use of ICTs in teaching and learning followed by the adoption of ICTs in teaching and learning. When reviewing the literature, I noticed that the various studies conducted on the challenges of ICT adoption in schools mentioned the lack of: ICT infrastructure, ICT training for teachers, knowledge and skills in the use of ICT, policy implementation, and confidence and resistance to change as factors that hinder successful ICT adoption. I also looked at international, national and local perspectives and the South African police environment where I discussed some of the policies implemented in South Africa.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research techniques and procedures adopted for collecting data. It starts with the description of the study location with references to a map illustration of Bohlabela District located in Bushbuckridge in the Mpumalanga province of South Africa. I followed by the description of the research paradigm, research design and research method. Lastly, I concluded with the overall summary of the methodology section.

3.2 Study Location

The study was conducted in five schools at the Mpumalanga Province of South Africa, under the Bohlabela District. Below is the map showing the Bohlabela District, Mpumalanga Province (Figure 3.1).
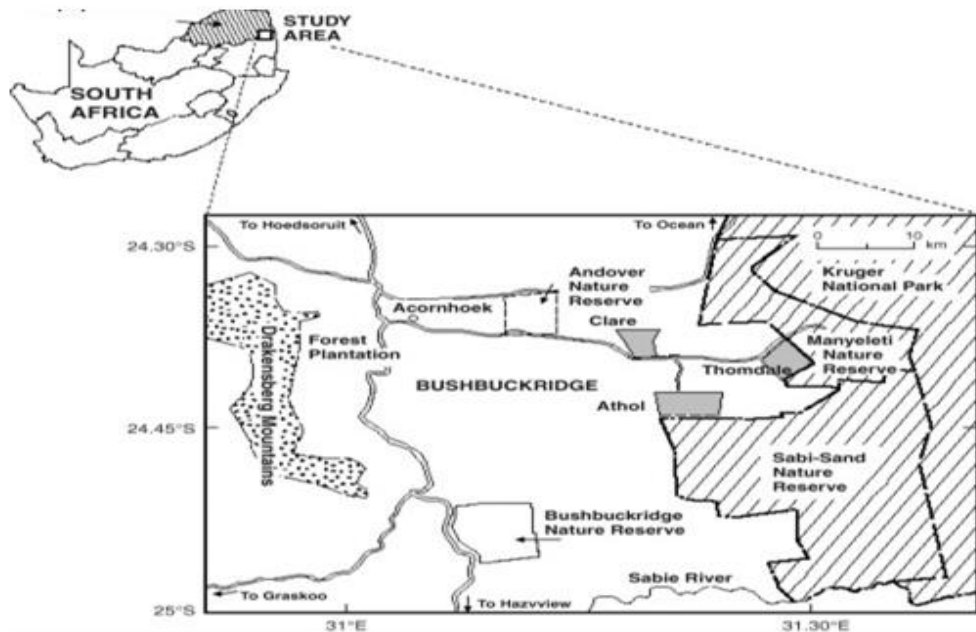
**Figure 3.1: Location of the three study sites in Bushbuckridge, South Africa
Source: Adapted from Shackleton (2000)**

Five schools were selected to participate in the study. These schools comprise of three primary schools and two secondary schools. Fifteen teachers and five departmental heads (HoDs) which brings a total number of 20 participants participated in the study.

The schools were located in Bushbuckridge area known for high crime rate (Mukwarami et al., 2020). Most people in the community were not familiar with the use of computers, they were computer illiterate. According to Murenga (2017) community lacks basic infrastructure such as electricity and ICT facilities hence, it prompted the adoption and the implementation of ICTs in school.

3.3 Research Paradigm

According to Held (2019), paradigm refers to the culture of a research which has sets of beliefs, assumptions and values used by a community of researchers. A paradigm is therefore a viewpoint or general framework which provides the lenses of how life is viewed. Kankam (2019) further explains that the research paradigm reflects our beliefs in relation to the world we live in, define a paradigm as "a broad view or perspective on something." Kaushik and Walsh define a paradigm (2019, p. 27) as a "shared understanding of reality". I argue that a paradigm is a set of beliefs that individuals have according to how they view things or reality.

In this study, the interpretivist paradigm was used to identify and describe the challenges encountered by schools in Bushbuckridge, Mpumalanga Province in adoption and implementation of ICTs. The interpretivist paradigm emphasises how an individual views and interprets social reality based on the ideological positions they hold. As a result, knowledge is gained through personal experience rather than being acquired from elsewhere. According to the interpretivist paradigm, reality is multi-layered and complex and a single phenomenon can have multiple interpretations.

According to Ryan (2018), the interpretivist paradigm has no single truth and reality is socially constructed. Using the interpretivist paradigm enabled me to conduct interviews with various participants in order to understand the challenges encountered in schools in the use or adoption of ICTs.

The interpretive paradigm prioritises comprehending the subjective nature of human experience (Guba & Lincoln, 1985). According to this, scientists "make meaning of data by their own thinking and cognitive processing of data guided by their interactions with participants" (Kivunja & Kuyini, 2017, p.33). The goal and main objectives of the

interpretive paradigm is to understand and interpret the subject's meaning as they infer it from their environment. Furthermore, the interpretive paradigm places focus on the individual and how they understand and see the world (Vollstedt & Rezat, 2019).

3.4 Research Design

According to Magana et al. (2020), a research design is a plan which can be used as an unfolding model which allows the researcher to create a level of detail from high involvement in actual experiences. The research design for the study is briefly discussed below.

3.4.1 Research approach

According to Finley et al. (2018), qualitative research approaches are useful for providing rich descriptions of complex phenomena, tracking one-of-a-kind or unexpected events and illuminating the experience and interpretation of events by actors with widely disparate stakes and roles. Qualitative research seeks to learn new things about a specific phenomenon, thereby providing an understanding of a phenomenon from the subjects' perspectives (Kalman, 2019). Data for qualitative research is gathered in a natural setting and environment to capture the context in which participants perceive the investigated phenomenon (Cypress, 2018).

In this study I followed a deductive research approach. The goal of using this deductive approach was to create a hypothesis based on an existing theory and to build a research strategy in order to test the hypothesis.

Deductive reasoning, according to one definition by Gulati (2009), entails moving from the specific to the broad. It may be accurate in many instances if a theory seems to imply a causal relationship or correlation. For instance, if the relationship or link does

not hold true under more general conditions, it might be tested using a deductive approach. I used the deductive research approach since it is a research approach with a logical process where the conclusion depends on the agreement of several premises that are taken as true.

I followed the deductive approach since it enabled me to explain the relationship between different variables and concepts. The advantages of using this deductive research approach was the fact that it helped me to measure the concepts in quantity, it also helped in generalisations of findings to a greater extent and lastly, in exploring known hypotheses.

3.4.2 Research strategy

In this qualitative research design, a case study approach was employed. Through case study research, I was able to describe behaviours, opinions and attitudes of the people being studied and use multiple techniques to collect data. According to Creswell (2008, p. 476), a case study is "an in-depth exploration of a bounded system based on extensive data collection". This study sought to investigate the challenges encountered in Bushbuckridge schools when implementing ICT in teaching and learning.

The use of case study research methods has been criticised. "Critics believe that a small number of cases cannot provide sufficient evidence to establish the reliability or generality of finding" (Yin & Marvin, 1984, p.45).

The case study research enables the investigation and comprehension of complex issues. It is a reliable research method, especially when a comprehensive, in-depth investigation is required. The case study design is useful to employ when there is a

need to obtain an in-depth investigation of a phenomenon. According to Rashid et al. (2019), a case study allows a researcher to obtain holistic characteristics of real-life events or situations.

I used a case study research method because it offered supportable data from direct observations of the individual entity involved. The observations I made during data collection provided me with the relevant information I needed and it showed the path that needed to be taken which would lead to specific results being generated. Those observations made it possible to replicate the results discovered by the case study method.

I used a case study method because it turns opinion into fact; the case study provides facts for a study since it looks at data which is generated in real-life situations. It is the way that researchers turn their opinions into information that can be verified as fact because it is a proven path of positive or negative development. In this case study, all the participants were engaged in the data collection process hence, participants were able to further their knowledge growth because of their interest in the outcome of the case study. Most importantly, the case study method it's important when dealing with complex issues and making decisions based on the question being studied.

Furthermore, I used the case study method because it can be done remotely. I did not need to be present at a specific location to use a case study, I was able to obtain research over the phone, through phone and WhatsApp calls.

3.5 Research Methods

According to McMillan and Schumacher (2010), research methods are ways of designing studies and collecting information and the techniques used to collect and analyse data. Qualitative research takes a humanistic approach to understanding a research question aimed at gaining a deep understanding of a situation. Its goal is to provide an explicit representation of the structure and broad patterns observed among a group of participants. A case study was used to employ various sources of data collection established in the setting.

There are varieties of data collection methods in qualitative research, although in this study, interviews, observation and document review were used. First, the sampling strategy used is explained in the following section.

3.5.1 Sampling strategy

Hayes et al. (2019) describe sampling as the process of selecting participants for a specific research study. Teachers and HODs who were School Management Team (SMT) members from various primary and secondary schools in the Bohlabela District were purposefully selected to take part in the study. A minimum of 20 participants were selected – 15 teachers and five HODs. In total five schools were selected, three primary schools and two secondary schools. A purposeful sampling method helped me to gather data on the challenges encountered by teachers when using ICTs in schools. The purpose of using the purposeful sampling method in this study was to obtain data from the population in rural schools – teachers who deal with everyday issues in the classroom – because I believed they would provide me with the relevant information as they deal with these complex issues daily in their schools or classrooms.

The type of purposive sampling I followed was homogenous sampling since I was only interested in one population (teachers). I did not want to collect data from parents because the focus was on teaching and learning using technologies in the classroom, of which I believed that parents were not going to provide me with the relevant information I was looking for.

3.5.2 Data collection

McMillan and Schumacher (2010) describe data collection as a process of collecting information from all relevant participants to find answers to the research problem or questions. According to Orkin (2014), the data collection method plays a significant role in providing valuable information to understand all the processes of observation and assess changes in people's views.

In this study, data was collected using interviews. The participants chosen for this study were people who were in charge of teaching and learning – teachers and SMT members since they would be knowledgeable in terms of what is happening in the classroom regarding ICT in education. When interviewing participants, I followed the semi-structured interview method whereby interviewers do not strictly follow a formal list of questions. In this semi-structured interview, open-ended questions were used to get complete insights from the participants.

Interviews

An interview is a structured conversation in which one party asks questions and the other responds. When gathering data, an interview is a useful method for learning about things that cannot be seen or heard, such as an interviewee's inner state and the reasons behind their behaviours and sentiments. An "active contacts between two

or more individuals leading to negotiated, contextually based solutions" is what an interview is, according to the dictionary (Fontana et al., 2008, p. 119). There are various ways of collecting data using interviews. One can conduct interviews in three ways, for instance, focus group interviews, conducting interviews online or using the telephone and lastly face-to-face interviews.

In the study I focused on face-to-face and telephone interviews. According to Donaghy et al. (2019), face-to-face interviews are structured interviews carried out by professional interviewers who use standard interview methodology and a standard set of replies to record the responses of participants. The face-to-face interview which I used extensively in the study was meaningful because I was able to see the body language of the participants as they were answering the interview questions. Secondly, I used a telephone interview since some schools would not permit me to conduct interviews during teaching and learning times. I focused on the telephone interviews, using phone and WhatsApp calls for the success of the interviews. The telephone interviews were meaningful since I was able to get faster responses and they were cost effective.

Teachers and HODs as part of the SMT were interviewed using a semi-structured interview method whereby the interviewer does not strictly follow a formalised list of questions. I made use of open-ended questions to get full insights from the participants. The open-ended questions were based on a set of criteria. The semi-structured interviews were conducted by me. I had a list of all the important questions that I wanted answers to from every participant I was interviewing, but I was willing to change the rest as the interview went on. These semi-structured interviews allowed me to elicit further information and follow up on what participants said while still giving

them the freedom to express their viewpoints. I interviewed teachers from all the sampled schools, namely schools A–E using the same criteria for questions. However, the questions were not the same for teachers and departmental heads (HODs).

The interviews were recorded. The recordings were meaningful when analysing data as participants verbalised their experiences of the challenges they encountered when implementing or adopting ICTs in teaching and learning in the classroom (please see Appendix 3 and Appendix 4 for the teachers and HODs interview questions).

Observation

Observation is a way for "the researcher to see and hear what is occurring naturally at the research site" (McMillan & Schumacher, 2010, p. 350). In addition, it entails having discussions, listening to what others are saying to one another and using some people as informants. The goal of a researcher is to gain a deep understanding of a phenomenon. The emphasis of observation is on meaning and interpretation (Qutoshi, 2018). Observation is a qualitative data collection method comprising the viewing and documenting of phenomena in their usual environment. Observation data are documented field notes that contain detailed information about the setting, participants and any activity associated with the topic of interest (Weston et al., 2021). Observation begins with context-specific descriptive observations, developing a general understanding of what is happening by observing people, activities and apparent emotions.

During the study I paid attention to the way participants were answering the questions and I was able to identify verbal and non-verbal clues. It was helpful because I was able to identify the main idea in the study findings. I was observing the available ICT resources from the schools where I was collecting data and I came across computers

that were underused and broken; as a result, I was able to get the information I was looking for before I began with the one-on-one interviews. Observation was another useful method of collecting data in the study. The observation method was "the most direct way of getting data, not what people have written, or what they have said but actually do" (Gillham, 2000, p. 46).

Document analysis

Document analysis is a systematic and logical process for reviewing or evaluating documents, both printed and electronic material (Bowen, 2009, p. 27). Document analysis, like other analytic methods in qualitative research, necessitates the examination and interpretation of data in order to elicit meaning, gain understanding and develop empirical knowledge (Corbin & Strauss, 2008; also see Rapley, 2007). Document analysis contains words and images that are recorded without the intervention of a researcher. I conducted a document review from the schools where participants were selected. This document review mainly focused on the inventories of the available ICT resources. I took pictures of the available resources I came across in the selected schools.

3.5.3 Data analysis and management

McMillan and Schumacher (2010) describe data analysis as a primary process of establishing data into groups and identifying patterns and connections among groups. The qualitative data developed during interviews was analysed using the thematic analysis method to answer the main research question on the challenges encountered by Bushbuckridge schools in the adoption of ICT in teaching and learning.

The responses from all participants on each question were coded and themes generated from the coded data. Hence, all answers were grouped according to the research questions. The purpose of this technique was to attain relevant information collected from the participants in relation to the research questions. I adapted this method because I because it was important to learn about participants experiences from their own observations in order to answer the research questions.

The responses obtained from the participants during interviews were transcribed and analysed using thematic analysis, for the reason that "thematic analysis is regarded as a textual analysis method in which the data is strictly reviewed and analysed to identify patterns or themes" (Braun & Clarke, 2006, p. 2). The interview transcriptions have been studied until I get to understand and to be more familiar with the data set.

When conducting this thematic analysis, I followed the six steps as proposed by Braun and Clarke (2006), known as familiarisation with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes and producing the final report. Data were coded and themes emerged. I coded data using manual coding, whereby I applied deductive coding. Deductive coding meant using participants' perspectives as one type of code. Themes and patterns were developed from the interview transcriptions to reveal participants' perceptions on the challenge of adopting and implementation of ICTs in schools.

According to Crosley (2021), thematic analysis is a qualitative data analysis that finds themes in a text by analysing the meaning of words and sentence structures. Thematic analysis is important when dealing with large amounts of data in a way that makes it easier to summarise the data. It is also useful when looking for personal information

such as a participant's experiences, observations and beliefs using interviews, surveys and social media conversations.

3.6 Trustworthiness

Trustworthiness is a significant part of establishing credibility. In this study, I linked the study findings with reality and made references to show the truth of the study results. Triangulation methods were employed using a variety of data sources for obtaining a complete understanding and relevant information of the study. Trustworthiness was applied to ensure the quality of the study in terms of validity and reliability (Connely, 2016). It is suggested by Maree (2007) that the use of different techniques for collecting data such as interviews guarantee trustworthiness in the study. A researcher made use of multiple sources to check data; the use of different sources gave the researcher more confidence given the fact that the sources have similar conclusions (Maree, 2007). Participants were given the transcripts to rectify their mistakes made during the process of the interviews. Confidentiality was maintained for the credibility of the study.

3.6.1 Credibility

Credibility is an important aspect of establishing trustworthiness. In this study, I linked the study findings with reality so that I could show the truth of the study findings. I used multiple data sources to obtain a complete understanding of the study.

3.6.2 Transferability

Transferability refers to the degree to which the results of qualitative research can be transferred to other contexts. Therefore, in this study, I have provided evidence that the study methods could be applicable to other contexts or situations by ensuring that

its methodology is credible. This study did not seek to generalise the findings since it is a qualitative study but rather sought a deeper understanding of the phenomenon, which is the challenges in adopting ICT for teaching and learning.

3.6.3 Dependability

Dependability refers to the consistency and reliability of the research findings and the degree to which research procedures are documented, allowing someone outside the research to follow, audit, and critique the research process (Sandelowski, 1986, Polit et al., 2006, Streubert, 2007). This research study was reviewed by my supervisor and language editing was done by a critical reader for the reliability of the study.

3.6.4 Confirmability

Confirmability has to do with the level of confidence that the research study's findings are based on the participants' narratives and words. In this study, I followed an audit trail to establish confirmability because it was incredibly useful when writing and discussing the results.

3.7 Ethical Considerations

I was aware of the number of formal standards I had to meet as I started this study. First, The University of South Africa (UNISA) committee approved my request and I received the certificate for permission to proceed with conducting the study. Then a letter was submitted asking for the Mpumalanga DoE, Bohlabela District permission to conduct the study (see Appendix 6). I also sent letters to all selected schools requesting permission to conduct the study (see Appendix 5). Participant teachers were made aware of their ability to withdraw at any time and given consent for

participating in the study (see Appendix 2) and a study information sheet was provided to the participants (see Appendix 1).

The rights of all participants were protected and privacy was maintained at all times. According to Bengtsson (2016), the researcher must adhere to promoting the determination of the study and the knowledge of the study to avoid errors. Ethical considerations are important in the study for the reason that they promote the aims of the study in escalating the knowledge, promoting collaboration and supporting moral values without any risks to the participants. The following informational points were included in my ethical considerations: I ensured that there were no risks to my participants; I made sure that all participants were kept anonymous and all participants gave full informed consent to participate in the study before we began with the study. I made sure I treated all participants with respect and dignity by avoiding misleading information and adhering to professional integrity at all times. Lastly, I applied and secured ethical clearance from UNISA.

3.8 Study Limitations

This research has the following limitations:

- It was sometimes time-consuming to collect data in this qualitative study; some participants did not have time for interviews. Therefore, I had to conduct some interviews on weekends.
- In some cases, participants refused to be interviewed. Those participants that refused to be interviewed had to be replaced.

- In this study, I focused only on one province, i.e., Mpumalanga. Because the aim of the study was to identify challenges encountered in Bushbuckridge schools in the adoption and implementation of ICT in schools.

- My limited time and resources prevented me from conducting the study in other rural schools in the Ehlazeni district in Mpumalanga for example; therefore, I had to focus on the Bohlabela District.

3.9 Conclusion

This chapter dealt with the overall methodology section on how, where and why data was collected. The study location and target population were discussed in detail. I justified the choice of the research paradigm, namely the interpretivist approach, which focuses on qualitative research. This implies that the researcher has a specific role in perceiving the social world. In addition, the research design, research methods and the study limitations were discussed in this section. The chapter also looked at the data analysis method that was used in the study.

CHAPTER FOUR: FINDINGS AND DISCUSSION

4.1 Introduction

The aim of this study was to identify challenges experienced by Bushbuckridge schools in the implementation of ICT in teaching and learning. The main question for the study is: "What are the challenges encountered by Mpumalanga schools in the adoption of Information and Communication Technology?" In order to respond to this question, secondary research questions were used to guide the responses of the study. This chapter presents and discusses the results of the study. A brief profile of participants is provided and findings of the study are presented and discussed.

The themes that emerged from the study are presented in accordance with the appropriate secondary research questions, i.e. 1) What are the infrastructure-related challenges in ICT-enhanced education in Bushbuckridge schools? 2) How does failure to adopt ICT impact teaching and learning in Bushbuckridge schools? 3) To what extent do teachers use ICT in teaching and learning in classrooms? 4) How can the use of ICT be improved in Bushbuckridge schools? and 5) What PCK must teachers have in order to adopt ICTs in the classroom?

The following themes emerged: a) A lack of digital infrastructure and facilities b) Obstacles in the adoption of ICT in teaching and learning c) Teachers' PCK/ beliefs d) The importance of ICT in Bushbuckridge schools, and e) Support from the school/DBE in relation to ICT adoption. This chapter concludes with the overall summary of the study findings.

4.2 Brief Profile of Study Participants

A total number of 20 teachers from five schools situated within the Bohlabela District were selected and interviewed using a virtual platform (cell phone) or face-to-face, depending on their preferences. These participants taught different subjects in different grades from diverse schools. At the time of the study, they were all employed by the Mpumalanga DoE in permanent positions. Some of these participants were selected in primary schools while others were in secondary schools within the Bohlabela District. The participants comprised of eight male and 12 female teachers. In order to maintain anonymity, codes have been used to identify participants.

Most participants were teachers with at least 6–30 years teaching experience. These teachers were considered to have been long (over five years) in the system. This category included heads of department. Only two participants had teaching experience of two and five years, respectively. These were considered to be the new recruits in the system. Both new recruits and those who had been long in the system were between 22 and 60 years of age. There were no detailed criteria used in selecting the 20 teachers that participated in the study. However, the selection was done randomly and based on the teachers' agreement to contribute to the study. All of the participants were from Bushbuckridge in the Mpumalanga Province as it was easier for me to have access to them and obtain relevant information since they were residing within Mpumalanga Province.

The selected participants had different teaching qualifications ranging from Advanced Certificate in Education (ACE), teaching diplomas, Post Graduate Certificate in Education (PGCE), Bachelor of Education Degree (B.Ed), and Bachelor of Education Honours (B.Ed Hons). Although they were all qualified for their teaching positions,

none of the participants had masters' and/or PhD degrees. Some of the participants taught subjects that they did not specialise in at university; for instance, some of these teachers were qualified to teach at secondary schools but they were teaching at primary schools during the study. Selected participants specialised in commercial subjects, but they indicated that they were teaching Mathematics, English, Natural Sciences, Tech and social sciences. Meanwhile, some teachers had a Foundation Phase qualification but were teaching Intermediate and senior phase at their schools. There was a vivid misalignment in the allocation of subjects and grades which they were qualified to teach.

The SMT in the study were heads of departments (HODs) and most of them had teaching diploma qualifications with more than 10 years of teaching experience. Table 4.1 below briefly illustrates the profile of the study participants.

Table 4.1: Brief illustration of the profile of the participants

Participants	Schools and School Type	Qualifications	Gender	Age	Teaching Experience
Participant A1		PGCE Diploma	F	31	6 Years
Participant A2	School A (Primary school)	PGCE	F	45	20 years
Participant A3		Bed Hons	F	37	9 years
HOD (1)			M	48	25 years
Participant B1	School B (Secondary school)	ACE	M	44	25 years
Participant B2		ACE	M	47	30 years
Participant B3		Diploma	F	43	20 years
HOD (2)		Diploma	M	44	25 years
Participant C1	School C (Secondary school)	B.Ed.	M	26	6 years
Participant C2		B.Ed.	F	30	5 years
Participant C3		B.Ed.	F	28	8 years
HOD (3)		ACE, Bed Hons	M	35	12 years
Participant D1	School D (Primary school)	PGCE	F	25	2 years
Participant D2		ACE	F	38	20 years
Participant D3		PGCE	F	30	6 years
HOD (4)		Diploma	F	56	30 years
Participant E1	School E (Primary school)	Diploma	M	39	17 years
Participant E2		ACE	M	40	24years
Participant E3		Diploma	F	49	27 years
HOD (5)		Diploma	F	57	30 years

4.3 Themes that emerged from the Study

4.3.1 Lack of digital infrastructure and facilities

This theme responds to the question – what are the infrastructure-related challenges in ICT-enhanced education in Bushbuckridge schools? Some participants indicated that schools did not have sufficient ICT hardware infrastructure such as computers, projectors, smart boards and learning management systems for all teachers to use. These are supposed to be provided by schools. The inadequacy of ICT hardware equipment and facilities create barriers in the adoption and integration of ICT for teaching and learning. Such inadequacy of basic ICT infrastructure is compounded by the lack of personal gadgets such as computers, laptops, tablets or iPad.

Participant D1 stated:

> We are willing to use ICT in the classroom but because of limited access to gadgets we are unable, we only have two computers in our school which are kept in the principal office hence, they are not enough to cover everybody.

This is consistent with Hasin and Nasir (2021) who assert that the lack of ICT infrastructure and facilities make teachers less skilled in the use of ICT and unable to use it in the classroom. Participants from schools with ICT hardware such as laptops, computers, projectors and printers reported that they were broken and not functional. They indicated that most of them were not working and needed to be repaired. However, schools did not have funds to maintain or fix the broken ICT equipment – as a result, it limited teachers and learners from engaging and collaborating in modern technologies during teaching and learning.

Salam et al. (2018) assert that various researchers argue that the lack of funds to procure the necessary ICT resources and to fix broken equipment is one of the reasons educators do not use technology in the classroom. The limited and broken ICT tools as a factor hamper the success of ICT adoption in schools (Prasojo et al., 2018). Consequently, this has a negative bearing on the development of TK for both learners and teachers. The lack of funds suggests that the DBE and SGBs do not prioritise the integration of ICTs in teaching and learning. There is a need to avert such tendencies so that learners and teachers can be equipped with much-needed digital skills.

Given the inadequacy of hardware infrastructure, the most obvious finding to emerge from the analysis is the unreliability of internet connectivity as that was reported by the participants as a concern in the adoption and integration of ICTs in schools. Limited internet access is a factor that demoralises schools from pursuing online learning (Sinha & Bagarukanyo, 2019). Teachers indicated contextual issues, commonly identified as the constraint of slow and unrealistic network connections. They indicated that internet connection in most schools is dysfunctional which affects the use of ICTs in the classroom. Once again, challenges that relate to unreliable ICT software have a direct impact on both TK and TPK since it is not feasible that every teacher will have the ability of knowing how to operate various technologies and to know how they can be used in teaching and learning. Bean et al. (2019) assert that the unstable network connections affect the quality of digital and online education since the connection could be lost and instructions delayed as a result of slow and poor internet connections.

Another important finding was that participants cited electricity supply as one of the major challenges in the integration of ICTs in schools. The ailing electrical infrastructure in South Africa has been degrading over the past decade (Hartmut Winkler, 2022) and compounds the ITC infrastructure challenges. The electricity supply in Bushbuckridge region is problematic; hence, teachers cannot operate their computers in their classrooms because of the intermittent electricity supply. One educator indicated that they are not using modern technologies in the classroom because of the electrical instability. The electricity supply is often not stable and hampers the integration of ICTs. Another participant indicated that they often disconnect power cables hence it is difficult to implement the use of ICTs in the school. In general, the lack of access to electricity affects the adoption and integration of ICTs in schools.

One unanticipated finding was that theft and vandalism were cited as amongst the factors or causes for the lack of ICT infrastructure. Participant B2 mentioned:

> The fact that school is vulnerable to crime and always spend a lot to beef up security by installing security cameras, we are not willing to adapt technologies in our school because it gets stolen.

This finding is consistent with that of Ratheko (2021), who reports that there is a high rate of theft and vandalism in the Bushbuckridge community. As a result, schools are disconnected from online learning because ICT infrastructure is stolen as a result of poor security (Chisango & Marongwe, 2021). A possible explanation for this finding might be the lack of funding that was reported earlier. In addition, the lack of prioritisation of security by both the DBE and SGBs might have a negative impact that prevents schools from providing the necessary securities to protect the ICT

infrastructure. As a result, schools must work in collaboration with the community for the development of the school and to safeguard the school infrastructure.

In this theme, namely the lack of digital infrastructure and facilities revealed three critical issues in the adoption and integration of ICTs in teaching and learning. These are the lack or insufficient ICT hardware and software infrastructure in schools, paired with poor maintenance; theft and vandalism of ICT infrastructure; and the ailing electricity infrastructure as compounding factors to the adoption and integration of ICTs in teaching and learning. These findings are rather disappointing and suggest that there is a need for multistakeholder intervention.

4.3.2 Obstacles in the adoption of ICT in teaching and learning

This theme responds to the question – how does failure in the adoption of ICT impact teaching and learning in Bushbuckridge schools? Various studies indicated several reasons for the obstacles in the adoption of ICT in teaching and learning. Personal characteristics such as educational level, gender, experience with computers for educational purposes and attitude towards computers, according to Schiller (2003), can influence technology adoption.

In this study, participants expressed concerns about time limitations as one of the factors that hinder the successful integration of modern technologies in the classroom during teaching and learning. They indicated that they do not have enough time in the school timetable to use ICTs in the classroom; hence more time is needed to use ICTs in their classroom with an effective educational plan that will be catered for in the timetable. Participant A3 stated:

In our school, the time allocation in the timetable does not favour incorporation with new technologies; therefore we can't integrate ICT in our classrooms because we do not have enough time to present lessons using modern technologies.

Participants reported that they do not have enough time to go over the lesson using technological tools, PK and CK. The limitation of time and difficulties in scheduling computer time for classes are seen as barriers for teachers using modern technologies in their teaching and learning. The challenge of the limitation of time is also noted by Ghavifekr et al. (2016) who assert that the absence of time allocation is another factor that blocks the integration and adoption of ICTs in schools. This suggests that the shortage of time in the school meant that educators were encumbered with multiple tasks and they would not have enough time to prepare and design lessons that incorporate modern technologies in the classroom. This finding supports evidence from previous observations (e.g. Al-Alwani, 2005; Becta ICT Research, 2004; Habibu et al., 2012, Raman & Yamat, 2014;) which report that many educators are interested in using computers and other online platforms in their classes during teaching, but due to the absence of time it is difficult to use ICTs in education. Meanwhile, Dang (2011) asserts that lesson preparation with modern technology takes time, as on average, one hour of ICT-enhanced instruction requires more hours of preparation. As a result, teachers encounter difficulties in preparing for or conducting lessons within the time constraints.

According to Almazova et al. (2020), a lack of time to carry out plans is one of the primary reasons why science teachers do not use ICTs in the classroom. The absence of time suggests that teachers should be capable of forming and organising learning environments in non-traditional ways by merging the use of ICT with new pedagogy.

They should be able to create an inclusive timetable that would cater for lessons that incorporate modern technologies and schedule enough computer time for classes to become familiar with the internet, prepare online lessons and to practice using ICTs before incorporating modern technology in the classroom.

Bigimlas (2009) indicates that teachers have a strong desire to use ICTs in teaching and learning although they come across some obstacles in the adoption process – these are a lack of confidence, lack of competence and lack of accessibility. According to Balanskat et al. (2006), while teachers appear to recognise the value of ICTs in schools, they continue to face challenges in incorporating these technologies into teaching and learning. In general, given the importance of ICTs in society and the future of education, identifying the potential barriers to integrating these ICTs in schools would be an important step towards improving the quality of teaching and learning.

The other finding was that training opportunities were not enough to equip educators to use ICTs in the classroom; hence, they were unable to use digital education. The inadequacy of ICT training creates barriers to the adoption and implementation of ICTs in schools. This is consistent with the finding by other scholars, that the lack of effective training is one of the challenges that affect the adoption of ICTs in schools (Buda, 2020; Maffea, 2020; Salam et al., 2018). Similarly, Sahboun and Razak (2020) highlight that a shortage of training is a barrier to effective ICT implementation in schools.

According to Shatri (2020), the issue of training is undoubtedly complex as it is necessary to consider a variety of issues. Certain components are required to ensure training effectiveness. To have successful ICT training, there must be enough time for

training, and pedagogical content and TK training. I argue that providing pedagogical training for teachers would be the greatest solution for the use of ICTs in the classroom rather than training them on the practicalities of technological tools – this is because without teachers who are knowledgeable enough to use these ICT tools and technologically driven instructional aids, there will be no modification and improvement in teaching and learning approaches.

Teachers' knowledge of and skills with technological tools have an influence on the operational application of ICT-driven instructional aids. This is because teachers know the sequential presentation of instructional tools to suit the interests of the learners and their relevance for instructional tasks. For instance, teachers who are computer illiterate would find it difficult to use computers or even to operate them in the classroom.

Participant C1 stated:

> We do not get enough training to use computers in our school and most of our teachers are computer illiterate, they prefer the traditional method of teaching and learning.

Participant C1 is in line with Rana and Rana (2020), who assert that inadequate TK was discovered to be the root cause of teachers' insignificant use of ICT in the classroom as a result of inadequate ICT training. This suggests that in order for educators to use technological tools effectively, ongoing ICT training is required. Also, teachers need to know the significance of ICT training to acquire the necessary TK. Furthermore, schools should devote themselves to professional development in order to keep up with rapidly emerging digital technological skills for the 21st century.

The finding implies that some teachers are not confident enough to integrate ICT into the classroom since they are not properly trained. This is maintained by Salam et al. (2018) who assert that a lack of teacher confidence is an obstacle that impedes the successful adoption of ICTs in schools. The lack of ICT training leads teachers to be less confident in the use of new technologies which creates a barrier in the adoption of ICTs in school. Therefore, the lack of confidence suggests that training is an essential need of teachers who are not proficient enough to use ICTs in the classroom, so that they can be equipped with the necessary ICT skills. To assist those who are not proficient enough and lack confidence, schools must offer enough ICT training for teachers so that they are well equipped with the TPK to gain and boost their self-assurance in the use of ICTs in schools.

A resistance to change is one of the factors that affect the adoption of ICT in schools and could be attributed to the teachers' shortage of TK and their lack of interest in using modern technologies. An interesting finding from participants was that some teachers did not want to move away from their traditional method of teaching because they did not have an interest to integrate ICTs in the classroom. They reported that they prefer the traditional methods of teaching and learning. Because of this, I therefore argue that the teachers' resistance to change implies that school leadership and management have neglected their duties as detailed in the South African ICT policy which asserts that management and leadership must provide a facilitative and mentoring role to other educators regarding the integration of ICT (DBE, 2004). Such attitudes in a school environment could discourage teachers who are willing to integrate ICTs into their lessons.

Semerci and Aydin (2018) assert that teachers' attitudes towards the use of ICTs are loaded in two ways, namely willingness and ICT anxiety. The findings from the study indicated that some teachers have a positive attitude towards technology; however, others showed a negative attitude towards ICT use. In addition, the participants reported that they have anxiety and are afraid to use ICT in education because if when something go wrong during teaching using technologies students might end up humiliating teachers. This is in harmony with Charles et al. (2015), who assert that teachers' attitudes towards technology are very positive but the use of them in the classroom is limited. I therefore drew the conclusion that attitude has the greatest influence on personal factors which as result impacts the person's integration of ICTs in education.

These findings under this theme – obstacles in the adoption of ICTs in teaching and learning, revealed that the lack of TK is due to insufficient ICT training; the absence of time in the school timetable; the lack of confidence in ICT use; the lack of interest and resistance to change as obstacles in the adoption and integration of new technologies in education. It also revealed that the lack of TK is due to the failure of the leadership and management of the schools to provide professional development opportunities to educators. It is vital for the leadership and management of schools to come up with solutions that will assist teachers in adopting and integrating modern technologies for 21st century education into teaching and learning.

4.3.3 Teacher's pedagogical content knowledge/ beliefs

Participant A1 from school A indicated that some teachers do not have the basic skills and knowledge to use technological tools in their classrooms. They have not received any adequate training in the use of technological tools, thus they lack the capability of

using ICTs during teaching and learning. Therefore, the lack of teachers' adequate ICT skills and knowledge created a barrier to the adoption of ICT in school A. Supporting this statement is Balanskat et al. (2006), who assert that teachers' ICT knowledge gaps cause them to be anxious about using ICT in the classroom and thus lack confidence in using them. Participant A2 stated:

Lack of ICT knowledge is problematic when integrating ICT in the classroom; I am only applying the knowledge that I have from the university when I am using a computer. We need proper ICT workshops.

Participant A3 added and said:

I believe in the traditional method of teaching and learning which I believe is more meaningful. I do not have enough skills and knowledge to incorporate technologies in my classroom.

Fear of using ICTs in teaching and learning due to limited skills and knowledge and also the lack of training and skills development on the use of technologies in schools hamper the success of ICT adoption. This means that in order to adopt ICTs in Bushbuckridge schools there is a need for the establishment of courses that focus on the TK on using different technological tools to equip both teachers and learners with expertise on ICT use. Also, they need more ICT tools to empower teachers with ICT knowledge for the improvement of teaching and learning. Some teachers stressed overcrowded classrooms with limited ICT tools as a barrier when adopting ICTs. They also expressed their worry about which suitable teaching strategies should be used when working with technological tools in the classroom. Participant D2 stated:

I cannot use technology in my classroom with more than 50 learners, how will I use my laptop without an overhead projector in an overcrowded classroom? Obviously, these learners will be distracted…. by bringing in computers in the classroom because some of them are not familiar with the

gadgets, they come from a poor background where most of their families depend on social grants.

According to Buda (2020), in the study titled "Stumbling blocks and barriers to the use of ICT in schools", he indicated that online platforms distract students from learning, and you have to find the way to make them focus and have a will to learn. The above statements highlight the importance of good management skills when bringing computers into the classroom and also informing teachers about management skills that are needed when engaging learners in a digital classroom.

Furthermore, participant E2 stated that they did not have specialised ICT educators in their school. For instance, teachers who are trained to teach ICT and graphic design are absent. The lack of specific knowledge about technology and how to combine it with existing PCK to assist students in learning created a barrier to adopting ICT in school E. The finding is underpinned by a similar study by Mumtaz (2006) who asserts that the lack of ICT specialist teachers to teach students computer skills was found to be the inhibiting factor that prevented teachers from using technology. Most teachers were appointed to teach subjects in their areas of expertise and now are expected to teach ICT properly without appropriate ICT training. I believe giving teachers opportunities to teach using technologies during their teaching practice would assist in coming up with different methods in which technology can be used in classroom preparation activities.

The foundation of any successful technology and education programme is ongoing professional development for educators. In order to investigate factors that facilitate teachers' skills and perceived student learning in technology enhanced classrooms, Holmes et al. (2019) carried out a qualitative study where they found that the principals

of the schools played a vital role as supporters of teachers' professional development, growth and retention. According to Thakral (2015), ICT is extremely beneficial to teachers' professional development and assists teachers to use ICTs as presentation tools via overhead and LCD projectors where learners view the same resources on computer screens at the same time with the teachers.

Therefore, this study concluded that professional development for educators is required that focuses on CK and PCK. Schools in Bushbuckridge must have teachers with subject expertise that understand learners' learning abilities and have adequate knowledge about the use of ICT tools. Adequate and meaningful training is required so that teachers are aware of the wide range of uses and potential benefits of ICTs in education. Lastly, in order for the latter to happen, teachers must integrate CK, PK and TK, in creating a new knowledge known as TPACK.

4.3.4 The importance of ICT in Bushbuckridge schools

Teachers emphasised the importance of ICTs and recognised its benefits for both teachers and learners. Technologies were envisioned as a catalyst for addressing educational problems and bringing about the desired change in the digital era (Weintropet al., 2022). The following assertion demonstrates the advantages of ICTs in teaching and learning in Bushbuckridge schools.

Participant HOD1 stated that using technological tools in the classroom has a positive effect on teaching and learning but this was not the case in this study, as it was established that most of the participants reported that they had no formal training on ICT usage. Hence, most teachers were not implementing it in the classroom. The same respondents said they were prepared to acquire the basic skills and knowledge on ICTs for them to improve their teaching styles when teaching learners reading and

writing. This is in line with Ghavifer and Rosdy (2015), who asserts that technologies help to improve students' capabilities, specifically in reading and writing and they aid teachers in improving teaching with updated teaching tools.

Participants indicated that technologies enhance the knowledge retention of learners and engage learners in the lesson. The study conducted by Henderson Dean (2020) supports the fact that communication tools support the teaching and learning process in the classroom as they increase the students' knowledge. Overall, students who are engaged in the lesson are more likely to acquire better knowledge and retain it than students who do not pay attention in class. For instance, when a learner practices, he learns more, unlike memorisation of the information. Technologies have made things more enjoyable as learners are involved in a variety of learning activities that help them retain new concepts and information.

One of the participants responded that they have a strong outlook that technology has simplified their work, as the head of the department was able to use ICTs for developing monitoring tools and instruments and also for capturing data for teachers' portfolios and making print-outs available for safekeeping in teachers' portfolios. This is congruent with the study by Baishakhi and Kamal (2016) who assert that technologies play a pivotal role in learners' and teachers' evaluation because all information is safely stored on computers in the school. I argue that the use of modern technologies in schools makes the work of departmental heads quicker, well-organised and manageable. Participant HOD3 stated:

> When I'm using a computer I'm benefiting because it saves me time in controlling teachers' work and my learners become motivated when I improvise by bringing my laptop in the classroom because some of them

are not familiar with the computer they pay too much attention as I was demonstrating the lesson.

It has been observed that technology provides great opportunities for modern learning, and it improves motivation and productivity (Henderson, 2020). Based on these results, it is clear that the use of ICTs increases learners' attention and motivation and prepares them for the realities of the modern world; as a result, it aids learners in developing analytical skills so that they can understand complex issues easily and have ownership over their learning.

Some participants indicated that they have learners with different learning styles; some learn best through visuals while others learn best through practice. For instance, when teachers demonstrate lessons using videos and posters to facilitate the teaching and learning process, students gain the confidence they need when it comes to arguing in the classroom, where they can provide clear clarifications and their judgements on certain issues and be creative. Using technologies in the classroom increases the motivation of learners and helps them to master the subject matter.

This theme – the importance of ICT in Bushbuckridge schools – addresses the significance of teaching and learning using technologies in the classroom environment with sufficient ICT tools and resources for 21st-century education. It shows that the use of ICT in education benefits both teachers and learners through motivation, creativity, knowledge retention, mastering the subject matter, language in reading and writing, improving the efficiency of the school, catering for different teaching and learning styles and assisting the HODs in managing and controlling the work of teachers and learners.

4.3.5 Support from the DBE in relation to ICT adoption

Some participants with a lack of ICT capabilities pointed the finger at the schools and DoE for not providing capacity building workshops and teachers' professional development to ensure that all teachers mastered the ICT skills required by 21st century education. They mentioned the lack of support as a problem that must be given earnest attention. The following declarations maintained the need for effective ICT training in Bushbuckridge schools. Participant B2 indicated:

> Nothing, the school does not provide training for ICT skills, only teachers who want to be trained they register for themselves or get funding like bursaries or study loans to be equipped with the ICT skills. Our school doesn't offer training for ICT skills.

Participant D2 stated:

> I think it's important for SGB and SMT to assess in training teachers and provide skill development program to equip teachers with necessary ICT skills in solving the problem of ICT.

Providing these workshops requires funding and some teachers indicated that financial support from the SGB and SMT is needed for ICT training and other forms of technological tools. In reality, the DBE must provide ongoing workshops for all teachers and prescribe a time frame for obtaining the skills so that all educators can be computer literate. Meanwhile, participant E3 stated that the department must send people to train teachers on using computers and ensure that all teachers succeed in integrating ICTs into their teaching practice. In addition, the school as well must organise the appointment of an ICT coordinator who can offer technical support for all teaching staff.

One of the participants highlighted the following: "I think it's important for teachers to offer them training and acquire necessary skills for ICT use and to support teachers through purchasing of new ICT equipment" (Participant B3). Participant E2 echoed: "We do not get any support" and Participant A2 agreed: "There is no support, nothing".

Some participants indicated that there is no support for ICT in terms of the curriculum policy and implementation in some schools. As ICTs in most schools have not been implemented, this study supports the fact that curriculum innovations that include the use of ICT can influence student learning provided educators know how to integrate ICTs into the curriculum. Teachers will have access to a wide range of new pedagogies if ICT if this is implemented.

The study survey on ICTs in South Africa organised by van Wyk and Crouch (2020) asserts that curriculum support and content development are needed for successful ICT adoption. Van Wyk and Crouch (2020) further indicated that curriculum support and content development should be included in any future survey initiatives. Based on this attestation, it is clear that the government must devote everything in its power to service delivery, to improve efficiency in the delivery of government services across the provinces for successful of ICT implementation in curriculum.

In supporting ICT in schools, I argue that the school principal, as a manager in collaboration with the school governing board, must establish and implement a digital leader role for teacher's support in the introduction of ICT in schools. Various participants in the study indicated that they did not get any support in terms of ICT; hence, it is difficult to adopt ICT in their teaching and learning. Meanwhile, the White Paper on e-Education (DBE, 2004) indicates that the DoE must stimulate and support the establishment of ICT training programmes in partnership with SME

(small/medium/enterprise) incubators for the maintenance and restoration of technological resources. Participant E1 stated:

> The treatment we get from the administration and school management is not supporting neither nor motivating us to use ICT integration effectively, our administrator does not support teachers in helping them to use printing machine, she always says 'teachers will break the machine, the computer will have the virus'.

Supporting this statement is Ghavifekr et al. (2018), who indicate that the management of schools often discourage teachers from adopting ICTs as they do not get support from the schools to attend workshops to use ICT effectively; hence, they do not encourage teachers to apply them in their teaching practices. This means that some departmental heads lack a pure vision of using technologies and motivating teachers to implement and adopt ICTs.

This theme – support from the DBE in relation to ICT adoption – reveals that in most schools, the SMT, school governing board and the Mpumalanga DoE do not play a pivotal role in supporting teachers and aiding them with 21st century skills for the classroom.

4.4 Conclusion

The research question was to find out the challenges encountered by Mpumalanga schools in the adoption of ICTs. Five issues were raised when finding out what hinders the adoption of ICTs in schools. These were the uncertainty of network connectivity; the lack of ICT infrastructure and facilities; teachers' lack of TPCK and beliefs; inadequate follow up support from SGBs and SMTs; and lastly, the lack of motivation from the schools on the importance of ICTs in schools.

Based on the findings from school A to school E, it is clear that these were barriers that hindered the adoption of ICTs in Bushbuckridge, Mpumalanga Province. The Mpumalanga DoE must intervene in addressing these challenges for successful integration of ICTs in schools. As a result of these challenges, communities should foster a sense of ownership in schools by caring and protecting the ICT infrastructure of the schools. Therefore, active community involvement in school development could be used as a mitigating factor that would see the protection of ICT infrastructure.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a study summary and conclusions and makes recommendations on what can be done to address the challenges of ICT adoption in Bohlabela District schools for useful teaching and learning application.

5.2 Summary of the study

Chapter One was the introduction which dealt with the background of the study, rationale of the study, problem statement, purpose of the study, research question, research objectives, theoretical framework and lastly the conceptual framework. In the introduction, I explained how the use of technologies or ICTs during the era of the COVID-19 pandemic transformed the education system intensely, with the notable rise of eLearning, in which teaching and learning were embarked on remotely and on digital platforms. As a result, it created unprecedented challenges for some of the rural schoolteachers, forcing them to adapt to teaching using 21st-century skills. However, for some schools, ICT was meaningful because it enhanced their subject learning, learners were able to learn during the lockdown and it improved engagement and information retention.

Chapter Two dealt with the review of related literature and the review was conducted under these themes, namely the use of technologies for teaching and learning, adoption and implementation of ICTs for teaching and learning, the international, national and local perspective, including the South African policy environment. In this chapter, previously related studies indicated several issues that hamper the implementation and adoption of ICTs in various schools. These barriers include the

lack of necessary physical resources, basic infrastructure and lack of qualifications; the lack of effective training on ICT skills; insufficient time; negative attitudes; lack of support from SGBs; lack of finances to fund ICTs; and inadequate curriculum content that supports ICT integration. The review of the literature also showed how various policies in South Africa support the use of ICTs in education for teaching and learning. Furthermore, Mbanda and Fourie (2020), state that the South African NDP 2030 policy has contributed positively towards ensuring that every learner is not left behind, even in rural areas, to achieve the agenda of 2030 as stated in the policy.

Chapter Three revealed the research methodology. The chapter dealt with the study location, research paradigm, and research design and research methods. Lastly, Chapter Four dealt with the findings and discussion. A brief profile of the study participants was given. The study findings are that the following are obstacles in the adoption of ICTs in teaching and learning: the lack of digital infrastructure and facilities; teachers' PCK/ beliefs; the importance of ICTs in Bushbuckridge schools; and support from the DBE in relation to ICT adoption. Chapter Five deals with the study summary of all the chapters, conclusion, recommendations and suggestions for further study.

5.3 Recommendations

Based on the findings and conclusions drawn from the study in the Bohlabela District, the following recommendations are made:

➢ It is recommended that due to an increase in the number of teachers and learners who lack TK and skills, the Mpumalanga DoE must do everything in its power to support teachers by offering them adequate training that focuses mainly on technological tools and the use of ICTs in teaching and learning.

Follow up should also be provided by the district to monitor the progress of ICT training and discuss the implications of the use of technologies in teaching and learning.

➢ The adoption of ICTs in schools should be implemented at an early age. I recommend that the Mpumalanga DoE must implement an ICT policy that focuses on all learning areas from pre-school to high school. They should encourage teachers who use traditional methods of teaching to expose them to the benefits of using ICTs in education.

➢ It is recommended that due to the challenges associated with ICT adoption in the Bohlabela District, the SGBs of the schools should ensure that there are available infrastructure and facilities for both teachers and learners, and ensures that all these technological tools are not underused.

➢ Due to the high crime rate which discourages the use of ICTs in schools, it is recommended that all schools must have security guards and cameras for the safekeeping of these ICT tools. The SMTs and SGBs of the schools should be the ones to manage and implement the school ICT policy that must be followed in the curriculum.

➢ The Bohlabela District should employ ICT instructors in schools who will assist in teaching teachers and providing technical support. The instructor will teach them the basic skills of ICTs so that teachers can improve their skills and be

confident enough to use those skills for the benefit of the learners in the classroom.

5.4 Suggestions for Further Research

The study was done on a small scale because it was conducted in only one district in the province of Mpumalanga, South Africa – as a result, the results cannot be used for a broader view. Therefore, similar studies could be conducted in other districts in the region for studies on a larger scale to give the broader view of generalisation.

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APPENDICES

APPENDIX 1: RESEARCH STUDY INFORMATION SHEET

Project Tittle: Challenges in the adoption of information and communication technology in Bushbuckridge schools

Project leader: Ngobe Andiso

Contact details: 0713306825/ 64032264@mylife.unisa.ac.za

Dear Prospective Participants

My name is Andiso Ngobe, a principal investigator. I'm doing research towards a Master of Education degree with the UNISA. My supervisor is Dr Phiwayinkosi Gumede from the Department of Instructional and Curriculum Studies. I would like to invite you to participate in a research study on the challenges in the adoption of information and communication technology in Bushbuckridge schools in Mpumalanga, Bohlabela District.

What is the purpose of the study?

I am conducting this research to find out the challenges encountered by Bushbuckridge schools in deploying and using ICTs so that remedial actions can be proposed to address such defies.

Why am I being invited to participate?

You are voluntary chosen to participate, because this study deals with the matter that occurs in the classroom during teaching and learning. Teachers and SMT will offer significant and valuable information regarding this study, since you know how this study can benefit curriculum for the future generation especially during these trying times of COVID-19.

Do I have to take part in the study?

No, Participation is voluntary therefore, it is up to you to decide whether to participant or not. At the end of this study information sheet you will then be ask to sign the consent form if you agree to take part in this study you will then be ask to sign.

What will happen if I want to withdraw from participation?

If you decide to take part in this study, you are more than welcome to withdrawn at any time without any giving reason or consequences. If you feel you are no longer interested to take part or withdraw your consent, please update me so that I can be aware.

Will my participation be kept confidential in this study?

Yes, all information provided by the participants including their personal information will be kept confidential and respect their right to privacy, I will not disclose your personal information. I will make use of numbers or letters referring or replacing a person's name, e.g. Teacher 1 or HOD1.

What will happen to the research results of this study?

The results will be written in the research report and discussion that will be assessed by my supervisor, in some cases, these results may also be published in a specific journal, you are free to contact me if you would like to see or read the results**.**

If you choose to participate, will there be any expenses for me, or payment due to me?

You will not get paid for taking part in this study and you will not bear any expenses.

Any risk for participation in the study?

No risk that may occur for participating in this study, its only question and answer.

How will the researcher(s) protect the security of data?

Hard copies of your answers will be stored by the researcher for a minimum of 3 years and electronic copies will be deleted from computer or laptop.

I thank each and every one of you for taking time in reading this study information sheet and participating in this study.

Thank you.

APPENDIX 2: INFORMED CONSENT TO PARTICIPATE IN THE STUDY

I_____, hereby voluntarily consent to participate in the following project, challenges in the adoption of information and communication technology in Bushbuckridge Schools in the Bohlabela District. I confirm that the person asking me to take part in this study have explained the nature of the study.

- I have read and understood the study as explained in the study information sheet.

- I understand that my participation in the study is voluntary therefore; I can withdraw at any time without providing reasons.

- I understand that the findings of the study will be processed into a research report or journal publication.

- I have received a signed copy of the informed consent agreement.

Participant name and surname……………………………………………………….

(Please print)

Participant signature…………………. ………….Date ……………………………………

Researcher's name and surname………………………………………………………….
(**Please print**)

Researcher's signature ………………………... Date ………………………………

APPENDIX 3: INTERVIEW QUESTIONS FOR TEACHERS

1. Do you have your own computer? If yes, how often do you use it, do the school provide you with data or Wi-Fi?

2. Do you have difficulties in using computer in teaching and learning?

3. What kind of difficulties do you experience?

4. What barriers do you encounter in the implementation of ICT in your school?

5. How do you deal with these barriers?

6. Is there any support you get in relation to ICT training that you get from the school or DBE?

7. What kind of support do you get if any?

8. What ICT training and skills does your school provide?

9. Bushbuckridge is known to have a high crime rate, how do you think this has an impact on the implementation of ICTs in schools?

10. Is there anything you would like to share regarding challenges in the adoption of ICT in schools?

APPENDIX 4: INTERVIEW QUESTIONS FOR HODs

1. Do you have your own computer? If yes, how often do you use it, do the school provide you with data or Wi-Fi?

2. How does ICT assist you in controlling teachers work?

3. What challenges do you experience in using ICT in teaching?

4. Did you receive any training on ICT usage?

5. What other support would you like to have?

6. Does ICT benefit your department (subjects)? Explain?

APPENDIX 5: PERMISSION FROM THE DISTRICT

UNISA | university of south africa

Andiso Ngobe

69 Colledgeview, Bushbuckridge 1270

andisongobe7@gmail.com

0713306825

To, Bohlabela District

Subject: **REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN SCHOOLS**

Dear Honourable Goba

My name is Andiso Ngobe, I am a teacher at Glory Hill Primary school and I am doing a research towards the fulfilment of the requirement of Master of education degree with the University of South Africa (UNISA) under the supervision of Dr P.R Gumede.

I am writing to request a permission to conduct the study entitled 'challenges in the adoption of information and communication technology: A case of Bushbuckridge schools in Mpumalanga Province, South Africa'.

The aim of this research is to collect information on the challenges encountered by Bohlabela (Bushbuckridge) schools in the adoption and using of Information and communication technology in schools, to help us achieve the following objectives of the study so that remedial actions can be proposed to address such defies.

- To determine the challenges of using ICTs in teaching and learning in the classroom among school teachers.
- To identify that to what extent do teachers use ICTs in teaching and learning in the classroom.
- To describe the implementation of ICTs in Bohlabela District schools.
- To recommendations how Bohlabela District can distribute devices to enhance ICT equitable.

This study will not be entitled to any risk. Data will be collected using interviews. I will also provide the schools with study information sheet and consent form for participate in the study. Upon completion of the study, I undertake to provide the Department of Education with a bound copy of my full research report. If you require any further information, please do not hesitate to contact me.

Yours sincerely,

Andiso Ngobe

APPENDIX 6: PERMISSION FROM THE SCHOOL PRINCIPAL

UNISA | university of south africa

Andiso Ngobe

69 Colledgeview, Bushbuckridge 1270

andisongobe7@gmail.com

0713306825

To, The School Principal

Subject: **REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN YOUR SCHOOL**

Dear Sir/Madam

My name is Andiso Ngobe, I am a teacher at Glory Hill Primary school and I am doing a research towards the fulfilment of the requirement of Master of education degree with the University of South Africa (UNISA) under the supervision of Dr P.R Gumede.

I am writing to request a permission to conduct the study entitled 'challenges in the adoption of information and communication technology: A case of Bushbuckridge schools in Mpumalanga Province, South Africa'.

The aim of this research is to collect information on the challenges encountered by Bohlabela (Bushbuckridge) schools in the adoption and using of Information and communication technology in schools, to help us achieve the following objectives of the study so that remedial actions can be proposed to address such defies.

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- To recommendations how Bohlabela District can distribute devices to enhance ICT equitable.

This study will not be entitled to any risk. Data will be collected using interviews. I will also provide the school with study information sheet and consent form for participate in the study.
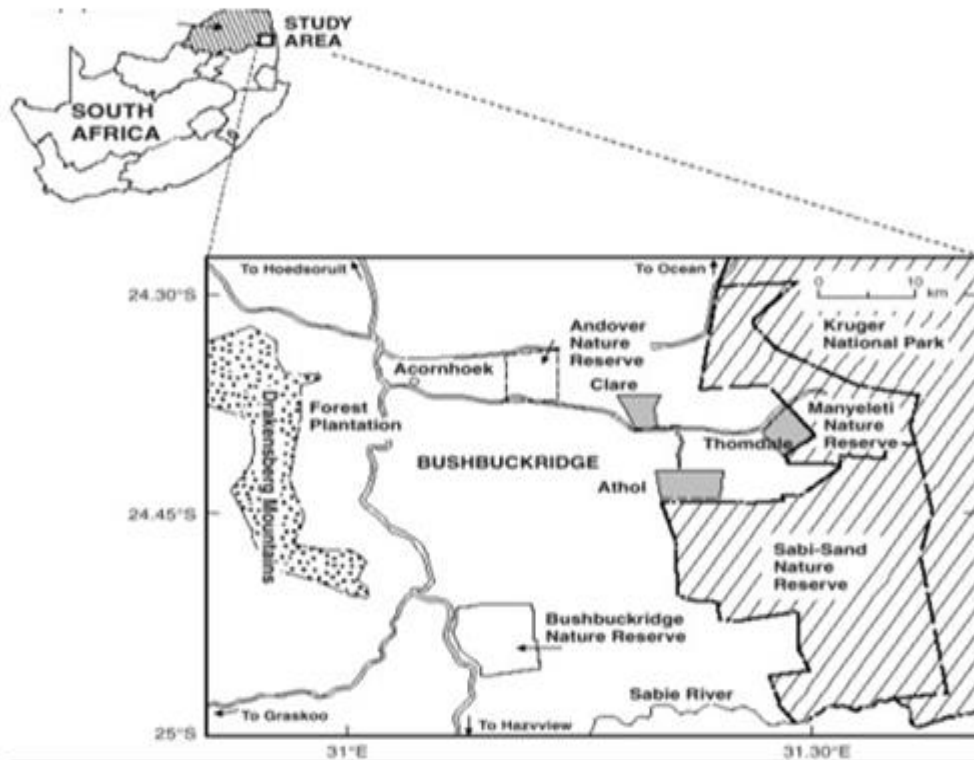
Upon completion of the study, I undertake to provide the school with a bound copy of my full research report. If you require any further information, please do not hesitate to contact me.

Yours sincerely,

Andiso Ngobe

APPENDIX 7: STUDY LOCATION

MpumalangaProvince

Location of the three study sites in Bushbuckridge, South Africa Source: Adapted from Shackleton (2000)