

Grade 1 Teachers' Knowledge and Use of Information and Communication Technology in Selected North-West Former Model-C Schools

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DECLARATION

I, **Moses Letsapa**, declare that the thesis, **Grade 1 Teachers' Knowledge and Use of Information and Communication Technology in Selected North-West Former Model-C Schools**, submitted for the qualification of **Master of Education** at the University of the Free State is my own independent work.

All the references that I have used have been indicated and acknowledged by means of complete references.

I further declare that this work has not previously been submitted by me at another university or faculty for the purpose of obtaining a qualification.


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ABSTRACT

Information and Communication Technology (ICT) has the potential to offer positive opportunities for transforming the education sector. Research has acknowledged the use of ICT in institutions of higher learning and in secondary schools where it has contributed to the improvement of students and learners' learning skills. Recently, many authors are convinced that ICT in Early Childhood Education (ECE) provides multiple possibilities for young children, improving their learning experiences. Therefore, the current study, conducted in selected North West former Model-C schools, explored teachers' knowledge of the use of ICT in Grade 1 classrooms. For this purpose, three former Model-C primary schools were purposively selected as research sites for this study. Participants, from each of the three different primary schools selected, were Grade 1 teachers with five or more years of experience. The study employed the qualitative method using interviews, document analysis and observation of lessons. Three Grade 1 teachers were interviewed using semi-structured interviews. Following the interviews, lesson plans and Annual Teaching Plans (ATPs) were requested from teachers to further explore their knowledge of how to integrate ICT in the classroom. Grade 1 classroom observations were conducted as the last phase of data generation in each of the three schools. The data generated from interviews, document analysis and observations were combined and analysed thematically through individual and combinatory analysis procedures. The Cognitive Theory of Multimedia Learning (CTML) was adopted as the theoretical lens which directed the study.

From the study, three main findings were revealed. The first finding revealed that former Model-C schools did not provide Grade 1 teachers with ICT tools for integration in classrooms. Teachers used their own ICT tools such as smartphones, Bluetooth speakers and laptops. Secondly, teachers only used ICT tools for their class presentations. Finally, Grade 1 teachers in former Model-C schools have limited knowledge on the use of ICT in teaching and learning. This is because of the lack formal training regarding the use of ICT and are dependent on their self-taught knowledge. The study recommends that the Department of Basic Education (DBE) should capacitate teachers with ICT knowledge through training and continuous workshops. Furthermore, the DBE should also provide teachers with relevant ICT tools to use in their classrooms, following the training and workshops. It is, therefore, the responsibility of the Provincial Departments to support

their teachers through continuous ICT trainings and workshops. It is recommended that policy makers ensure that the e-education and school-based ICT policies are made available to teachers and that they are fully implemented. The Curriculum and Assessment Policy Statement (CAPS) should be revised to include specific guidelines on how teachers can integrate ICT into various subjects.

Keywords: Foundation Phase, Grade 1 Teachers, Information and Communication Technology, literacy, Cognitive Theory of Multimedia Learning (CTML)

DEDICATION

My work is dedicated to my son, Reatlegile Phora, who endured my absence as I worked on this dissertation.

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LIST OF ABBREVIATIONS AND ACRONYMS

ATP	Annual Teaching Plan
CAPS	Curriculum and Assessment Policy Statement
CTML	Cognitive Theory of Multimedia Learning
DBE	Department of Basic Education
DoE	Department of Education
ECD	Early Childhood Development
ECE	Early Childhood Education
FP	Foundation Phase
ICT	Information and Communication Technology
LTSM	Learning and Teaching Support Materials
MoE	Ministry of Education
NSC	National Senior Certificate
PPT	Power point presentation.
PCK	Pedagogical Content Knowledge
PK	Pedagogical Knowledge
TCK	Technological Content Knowledge
TK	Technological Knowledge
TPK	Technological Pedagogical Knowledge
TPACK	Technological Pedagogical Content Knowledge

CHAPTER 1: INTRODUCTION

1.1 Introduction to the study

Studies conducted in Early Childhood Education (ECE) around the world have proven that learners are performing poorly in their academics (Wilmann, 2017; Jordaan, 2021; Mpiti & Makena, 2022). Throughout the years, researchers have indicated that learners are struggling with reading and writing during their early grades of schooling (Lawrence, 2011; Nikolopoulou, 2020; Belle, 2021). Similarly, Mathematics appears to be a challenge faced by learners in the ECE (Zaranis, 2020). Various intervention strategies such as school infrastructure, teacher training, pedagogical practices and reduced class-size have been implemented to aid the poor performance of learners in ECE albeit to no avail (Jordaan, 2021; Dean, et al., 2021).

Information and Communication Technology (ICT) has assisted in positively transforming the education sector. Koslova and Pikhart (2021), Perez et al. (2021) and Pondiwa et al. (2021) have indicated that ICT integration at higher institutions of learning reported some advantages. ICT in higher institutions of learning provides asynchronous learning through recording of lessons. Additionally, it promotes collaborative and cooperative learning and provides opportunities for the enhancement of creative and independent learning amongst students (Koslova & Pikhart, 2021; Perez et al., 2021; Pondiwa et al., 2021). Similarly, recent studies by Akinoso (2023) uncovered that using ICT in secondary schools assists with improving learner's learning skills and motivation and connects learners to various sources of information. The use of ICT supports active learning environments and learner-centered approaches.

Recently, there has been significant support and interest in integrating ICT in ECE to improve learners' learning experiences (Alobaid, 2020; Dean et al., 2021; Venketsamy & Hu, 2022). Learners in the ECE range between the ages from birth to nine years old and this stage is regarded as the most important phase of learner life. This is supported by Hannaway (2016) and Nikolopou (2020) who argue that the experiences in the early years of a child's life have an impact on not just their own development but also the development of society and the wider world. Therefore, as Belle (2020) argues, the

government has the responsibility to ensure that they provide quality education to learners in their ECE so they may perform better in subjects such as Mathematics and Literacy. Similarly, Kumari (2014) uncovered the fact that integrating ICT in the ECE curriculum may lead to better language and literacy acquisition. These outcomes are associated with better letter recognition, sequencing and sounds, listening and comprehension, vocabulary, and understanding concepts about stories and print. In addition, the young learners may better understand concepts such as number recognition, counting, shape recognition, composition and sorting, with ICT (Zaranis, 2020). The integration of ICT in young children education can therefore be regarded as an important aspect that should be carried out by teachers who have knowledge in technology.

ICT has proven to be beneficial in young children's learning as it is reported that children show more interest in their learning when the information is presented with various colours, images, text and hyperlinks. This suggest that using various multimedia in learning is more effective than when learning is only presented in books with black texts on white sheets (Kumari, 2014; Nikolopoulou, 2020; We et al., 2021). These studies further suggest that learning with ICT will lead to language and life skills development when learners are actively engaged in activities that are planned well by teachers. Therefore, it can be said that the usefulness of ICT in early grades depend on how effective teachers integrate them in their process of teaching and learning (Hannaway, 2016).Consequently, it is significant that teachers in the early grades should have knowledge of how to use ICT in teaching and learning.

The constitution of the United Nations Educational, Scientific and Cultural Organization UNESCO (2024) recognises the significance of integrating ICT when teaching literacy in education as it can provide universal access to education, educational equity, quality teaching and learning, and the professional development of teachers. Therefore, several countries, both developed and developing, have embraced and integrated ICT in their education system. In Canada, the integration of ICT in education is guided by the Learning and Technology Policy framework which outlines that ICT should be used to promote student centred learning. According to this policy, all teachers and learners have access to relevant ICT tools, appropriate infrastructure, reliable network connection and the environment that is conducive for digital learning (Alberta Ministry of Education ,2013).

According to Nikolopoulou (2019), in all Greek public schools, classrooms are well equipped with ICT tools such as interactive whiteboards and overhead projectors. Teachers attend in-service training on the pedagogical use of ICT tools which aimed at providing teachers with the rightful skills needed to design learning activities using ICT (Nikolopoulou, 2019). Trainings of this nature are important as they extend the teachers knowledge regarding ICT usage in the process of teaching and learning (Hannaway,2016). This study focused on the knowledge and use of ICT by Grade 1 teachers in former Model-C schools. Former Model-C schools are schools that were only attended by white children during the apartheid era, which are currently multiracial, “fee-paying” schools that are situated in affluent urban areas and ranked between quintile 4 and 5 by the (DBE, 2020). The South African government has categorised public schools into 5 quintiles for purposes of allocating financial resources (Obonnaya & Awuah, 2019). Schools situated in poor communities are ranked quintile one, while those in affluent communities are ranked quintile five. Quintile one to three schools are non-fee-paying schools and receive more funding from the school, while quintile four and five schools receive less subsidy from the school and parents are paying school fees. Since learners in these schools pay school fees, it is easier to buy and maintain ICT tools and infrastructure (Chitha, 2014). Therefore, there is a need for the teachers to have knowledge and skills on how to use these ICT tools in teaching young learners from Grade 1 in the Foundation Phase. ECD in South Africa (SA) includes pre-Grade R programmes, Grade R programmes and the Foundation Phase (Grades 1–3). The Foundation Phase (FP) education programme in South Africa includes Mathematics, Life Skills and Literacy as subjects. Literacy requires learners to develop reading and writing skills from grade 1 to 3. Studies indicate that learners who are unable to read by the end of grade 3 are 25% unlikely to complete the National Senior Certificate (NSC) compared to learners who are proficient readers (Hernandez, 2011; Plaatjies, 2021). A study conducted by Lesnick et al. (2010) also revealed that those learners who cannot read at grade level by Grade 3 will experience difficulties in comprehending the necessary educational materials in grades to follow. Similarly, Arnaud et al. (2021) argue that many children, particularly those from less advantaged backgrounds, are at a risk of growing up without possessing the basic literacy skills needed to succeed later in life. Furthermore, many learners who are recommended for special school education are

recommended because of poor literacy and mathematical skills (Nikolopoulou, 2020). To curb such occurrences, the use of ICT in teaching and learning in Grade 1 could be one way to plug the gaps in the FP.

ICT has been identified as a tool providing several advantages that contribute towards effective education in Foundation Phase. Grade 1 teachers' use of ICT when teaching Literacy can assist learners in developing the necessary early reading and writing skills (Mercy, 2016; Willmann 2017; Mpiti & Makena 2020). In support of this, there has been a major shift from the traditional curricular to the one that is ICT-integrated (Mercy, 2016). As early as 2004, the Department of Education stated that "ICT is the combination of networks, hardware and software as well as the means of communication, collaboration and engagement that enable the processing, management and exchange of data, information and knowledge" (DoE 2004:12). Some of the ICT tools that can be used by Grade 1 teachers in classrooms may include Google maps, YouTube videos, E-Books, PowerPoint presentations (PPT) and video conferencing, amongst others (Mahlo, 2020).

A study by McManis and Gunnewig (2012) advocate that ICT tools allow learners to take advantage of new learning platforms as well as aiding them with effectively grasping new knowledge through activities that are related to their immediate interests and real-life situations, such as effective communication. Research conducted by Dean et al. (2021) revealed that ICT reading intervention strategies improved the reading skills of those learners who had reading difficulties. These studies also uncovered that ICT is beneficial in education as it makes knowledge acquisition more accessible to learners. ICT tools enable learners to discover learning topics and solve problems easily through using grammar games for literacy in the Foundation Phase.

1.2 Background

Previous research has shown that there is a need for stronger literacy development in early grades to equip learners with a better learning experience (Inoue et al., 2018; Zhang, Inoue & Georgiou, 2020; Georgiou, Inoue & Parrila 2021). Grade 1 teachers'

utilisation of ICT has the potential to assist learners in becoming literate and career orientated adults who will contribute to the society.

ICT usage in most African countries is still lagging and as a result, these countries are moving at a slow pace with regards to ICT integration in their education systems (Baria,2020) Although there are elaborate ICT policies in education, countries such as Uganda, Ghana, Liberia and Zambia have limited use of ICT in education. (Lyoyd, 2020). For instance, the Ghanaian Ministry of Education provides ICT tools to schools to promote the use of ICT in their education. However, research conducted by Mukhari (2016) and Selmi (2023) suggest that the main challenge is the teachers' lack of knowledge in selecting the appropriate ICT tools for teaching their subjects. Teachers need technological knowledge to successfully integrate ICT to their lessons.

In South Africa (SA) the Department of Basic Education (DBE) published its White paper 7 on e-Education in 2004 and called together a "think tank" based on an overview of the research and delivery needs related to the roll-out of e-learning in schools (Moll et al., 2017:05). The DBE (2004) states that integrating ICT into the classroom is a key component of the government's plan to improve the quality of teaching and learning throughout the training and education system. The goal of the policy is to educate and prepare a new generation of young people who are accustomed to technology and are growing up in a digital world. It is expected that schools would reflect these new realities.

The DBE delegated the implementation of the policy to the nine provincial education departments in SA. It was the responsibility of the provincial education department to ensure that the policy is implemented (Sadeck, 2016). The response from the provincial departments was to get technology into schools first. This was seen as progress towards obtaining one of the seven objectives as reflected in the White Paper Policy. The DoE had conducted several ICT pilot studies, ensuring that schools are connected with internet, and providing training on technology and computer literacy. This was seen as the initial stage of e-Education in SA. It has been almost two decades since the existence of this e-Education policy. However, a recent study by Msiza et al. (2020) indicated that there is no adequate progress on the implementation of the policy nationwide. The

Department of Basic Education (DBE) has since introduced operation *Phakisa* – which implies ‘hurry up’ (Munje & Jita, 2020:266). The programme’s objective is to ensure that all the key players of this policy are ready and identify existing challenges to be addressed. However, even after such developments on e-Education policy, South African teachers still experience challenges with regards to ICT integration.

The COVID-19 outbreak that hit the world magnified some challenges that teachers experience in terms of integrating ICT in their teaching. COVID-19 changed the nature of instruction in schools where knowledge and utility of ICT tools became a normal approach (Briscese et al., 2020), with basic ICT resources like cell phones, computers, laptops and smart phones being used. However, many teachers in SA could not manipulate the other ICT tools that were needed to ensure that teaching and learning took place throughout the COVID-19 lockdown (Dube 2020). This resulted in teachers experiencing challenges with assisting learners during the pandemic. Foundation phase schools (grade 1 to 3) used a rotation system which meant that learners without ICT tools were not learning on days they were not at school. This meant that their learning of basic literacy skills, such as reading and writing, was compromised. According to the DoE (2004), most teachers were raised in an era where electronic technology was not always available; therefore, they find adapting to technology more difficult than the learners they teach. Similarly, a recent study conducted by Filita and Jita (2021) confirms this by revealing that teachers are often inexperienced when it comes to manipulating digital technologies needed in the process of teaching and learning. Therefore, there is a need for a study that will explore Grade 1 teachers’ knowledge and use of ICT in former Model-C schools. Several studies that are conducted around the use of ICT focused more on quintile 1 to 3 schools and less was conducted in former model-C schools that are ranked between quintile 4 and 5.

Chisango et al. (2019) conducted a study on teachers’ perceptions of adopting ICT in Teaching and Learning at rural secondary schools in Eastern Cape. According to the study findings, teachers were computer literate but lacked the knowledge to integrate ICT in their subject content. Furthermore, the study revealed that the unavailability of ICT tools in schools was amongst factors that hindered teachers use of ICT. Dlamini and Zenda (2022) also found that teachers in townships lacked the knowledge to use ICT in their classrooms. It appears that teachers need technology knowledge to effectively integrate

ICT into their subject (Koehler & Mishra,2009). It is also important to highlight that the availability of ICT tools also plays a major role in deciding whether teachers will use ICT or not. Teachers in former model-C schools are in a better position to use ICT as their schools are fee paying and may afford to buy ICT tools for teachers.

It is worth noting that having ICT tools and infrastructure in schools does not necessarily imply that it will be used by teachers in their teaching and learning. Studies done by Mihai (2019) suggest that many schools are equipped with ICT tools, but teachers are failing to plan their lessons using ICT. Mukhari (2016) conducted a study on the usage of ICT in urban schools and findings indicated that teachers' lack of ICT knowledge and skills hindered ICT integration in classrooms. Similarly, a study by Murithi and Yo (2021) revealed that inadequate pedagogical knowledge of integrating ICT in teaching and learning among primary school teachers was a challenge. Therefore, investigating how Grade 1 teachers use ICT in their teaching is imperative, thus highlighting the importance of this study.

The e-Education policy (DoE, 2004) emphasises the goal of producing learners who are competent using ICT, while developing the skills and knowledge they need to achieve personal goals; as a result, they will be active participants in the global community. To achieve this, the policy outlines that ICT is not a teacher replacement, but just a tool to supplement their teaching and enhance the quality of teaching and learning This implies that teachers will remain the most important stakeholders in ensuring that the e-Education policy achieves its outcomes. Therefore, it is important for this process to start at early ages in the Foundation Phase. Many teachers are more familiar with the conventional way of teaching and may experience challenges with integrating ICT tools in teaching of subjects like Literacy, Life Skills and Mathematics in Grade 1.

For e-Education policy goals to be achieved in SA, teachers need to manipulate ICT tools. "By implication, this entails that teachers must have the knowledge and skills to use them in their teaching and learning, find comfort with using them and understand the potential they bring" (Sadeck, 2016:188). At the heart of this, Grade 1 teachers are urged to integrate ICT in their teaching to achieve the e-Education policy objectives of equipping learners with ICT skills. Furthermore, by researching the potential that ICT has on

teaching in grade 1 classrooms, teachers will become more knowledgeable about using ICT to effectively teach Literacy and Mathematics. Consequently, the use of ICT will support learners in reading and writing and thus allow them to become literate adults who will be competent in using ICT in future.

1.3 Problem Statement

The study addresses how Grade 1 teachers in former Model-C schools teach in a meaningful way using ICT. Although former Model-C schools are well resourced with ICT tools, studies suggest that the use of ICT in these schools is not satisfactory (Mukhari, 2016; Mihai, 2019; Chisango & Marongwe, 2021). In SA, Grade 1 is an important level where many learners begin their early formal education. This grade includes subjects such as Life Skills, Mathematics and Literacy. Early literacy skills in Grade 1 provide opportunities for the learners' ability to read, write and speak, while early mathematical skills like matching, sorting and seriation often assist learners with problem solving skills (Neumann, 2020; Nikolopoulou, 2020). Basic literacy skills set a foundation for learning and can determine the learners' future achievements in life (Belle et al.2021). However, studies reveal that South African Grade 1 learners are performing poorly in Mathematics and Literacy (Fair, 2019; Jordaan, 2021; Venketsamy & Hu, 2022). According to Business tech (the minister's comments, 09 June 2022:01), the Minister of Higher Education, Science and innovation, Blade Nzimande, reiterated that only 4% of learners that start grade 1 in SA end up with degrees, while the rest drop out of school.

Researchers such as Kumari (2013), Hannaway (2016), Amalia et al. (2021) and Venketsamy and Hu (2022) have identified a connection between successful early literacy skills and the use of ICT skills which are necessary in the field of education (Amalia et al., 2021). For instance, Dube (2018) discovered that teachers who use ICT in class reported that it allowed them to reach their teaching outcomes more easily. Voogt et al. (2013) argue that ICT enables learners to get an in-depth understanding of any concept taught in class. Furthermore, Wilson et al. (2015) reported that ICT integration promotes collaboration and communication amongst learners, a practice that is needed in Foundation Phase classes. Another recent study by Lei et al. (2021) put forward that students with greater ICT literacy have the advantage of performing very well in ICT-

integrated activities. With the help of ICT, teachers have a potential solution at their disposal – to bridge the Literacy and Mathematics gap that exist amongst learners in Grade 1.

The DoE (2004) outlines the benefits of ICT in education as creating access to learning opportunities, redressing inequalities, improving the quality of teaching and learning, and encouraging lifelong learning. Furthermore, ICT allows for differentiated learning styles and eliminates learning barriers through the provision of expanded opportunities and learning experiences that are individualised (Dhlamini & Shaik, 2020; Belle et al., 2020). The use of ICT will allow Grade 1 teachers to shy away from relying on traditional pedagogical practices in their teaching of Life Skills, Literacy and Mathematics. By integrating ICT in Grade 1, teachers have the ability to rekindle pedagogical practices by introducing newer teaching strategies, preparing lesson while using the internet, utilising interactive games to introduce grammar lessons, and viewing films for literature classes; such methods will make Literacy more enticing for learners (Rosa, 2016).

The e-Education initiative has been on the DoE drawing board since 2004. The COVID-19 outbreak acted as a wakeup call and a catalyst for the dire need of the implementation of ICT in education. One of the general aims of the Curriculum and Assessment Policy Statement (CAPS) is to produce learners who are able to use technology effectively and critically, showing responsibility towards the environment and the health of others (DBE, 2011). Moreover, learners in the 21st century are exposed to new and various technologies in their everyday lives which changes the way they respond to instruction at school (Mpiti & Makena, 2021). While there are several studies conducted around ICT integration in schools, and how ICT can benefit ECD, there is little research on how Grade 1 teachers teach using ICT. Therefore, a gap in literature exists that deals specifically with how grade 1 teachers teach Foundation Phase subjects using ICT. Therefore, there is a need to assess Grade 1 teachers ICT knowledge, the type of ICT tools they use and how such ICT tools are being used.

1.4 Research questions

The main research question for this study is:

What is Grade 1 teachers' knowledge and use of ICT in selected North West former Model-C schools?

The secondary research questions are:

- Which ICT tools do teachers in former Model-C schools use to teach in Grade 1?
- How do teachers in former Model-C schools use ICT to teach in Grade 1?
- What is teachers' knowledge on the use of ICT to teach Grade 1 in former-Model C schools?

1.5 Research aims and objectives

The aim of this study is to explore the Grade 1 teachers' knowledge and use of ICT in selected North West former Model-C schools.

The main objectives of the study are to:

- identify ICT tools teachers use to teach in Grade 1 in selected North West former Model-C schools.
- investigate how teachers use ICT to teach in Grade 1 in former Model-C schools.
- assess the teachers' knowledge on the use of ICT to teach Grade 1 in former-Model-C schools.

1.6 Significance of the study

ICT knowledge is vital, particularly for teachers who are currently teaching learners in the 21st century where the world is becoming digital. It is also important to note that this study will benefit grade 1 teachers as they will get to learn about how to use various ICT tools to teach subjects such as mathematics, English and Life-skills. This will also benefit learners as teachers will use multimedia to enhance learners understanding. Once grade

1 teachers master the ICT knowledge, they will then pass this knowledge and skills to their learners. Learners will use this technological knowledge not only for their studies, but even on their everyday life to connect and develop holistically.

1.7 Delimitations

Data was collected from three schools in the same province, the North West. These schools are from the same Ngaka Modiri Molema District. The participants were three grade 1 teachers from former Model-C schools that are ranked quintile four. This study employed a qualitative research approach and used interviews, document analysis and observations to understand Grade 1 teachers' knowledge and use of ICT.

1.8 Limitations

There are few limitations of this study. The data was successfully collected from three former Model-C schools in the same province and district. However, since the study was only limited to one district, other districts in the province were not included. Another limiting factor is that the study was based only in fee-paying schools that are situated in affluent areas. Therefore, these results may not apply to no-fee paying schools in the rural schools.

1.9 Definition of key terms

Information and communication technology (ICT)

ICT refers to any forms of technology used for sharing information. ICT tools are used in the teaching and learning process and may include the internet, cellphones, applications, social media platforms and computers. Makuru and Jita (2022) suggest that the goal of using ICT tools is to achieve fruitful learning in and out of the classroom.

Teacher

A person working for the DBE responsible for assisting learners to acquire knowledge, competencies, or values. A teacher is responsible for guiding students through the prescribed curriculum (Cauthen, 2019). A teacher is a designation for the office, position, and profession for someone who devotes himself in the field of education through patterned educational interaction, formal and systematic. Furthermore, Sethosa (2021) suggests that there is an interactive relationship that exists between a teacher and his learners that is based on knowledge building and encompasses foundational learning, sub-skills and socio-cognitive dynamics.

Literacy

Literacy is the learner's ability to read and write in different forms such as visual, electrical or electronic (Hobbs, 2016). Furthermore, Plaatjies (2020) adds that reading is a dynamic, active and complex process that involves the understanding of written text, developing and interpreting meaning and using meaning as appropriate to the type of text, purpose and situation. Writing, on the other hand, is regarded as an extremely complex cognitive activity in which the writer is required to demonstrate control of variables simultaneously. At the sentence level, these include control of contents, format, sentence structure, vocabulary, spelling and letter formation.

Foundation Phase teacher

A teacher who is responsible for teaching learners from the age of 5 until 9, who are in the early grades of Grade R-3 in a South African education system. This teacher is mainly responsible for teaching reading, writing and arithmetic skills (Green et al., 2014)

Foundation Phase

Masote (2016) defines Foundation Phase as the initial stage of formal schooling in South Africa that involves teaching learners from Grade R until Grade 3 which is from the age of 5 to age of 9.

Former Model-C schools

These are types of schools that, under the apartheid government in SA, were classified as being for whites only (Chitha, 2014). These schools are currently multiracial and are situated in affluent areas, receiving subsidies from the state according to the National Norms and Standards of School Funding. They are also “fee paying” schools and are well resourced.

1.10 Chapter outline

Chapter one presented and gave a summary of the entire research study. The problem statement, primary research questions, goals, and objectives were the main points of emphasis. It described the limitations and delimitations of this study. This chapter also included a definition of words.

Chapter two focused in-depth on the variety of literature regarding ICT use in education. This study was underpinned by the Cognitive Theory of Multimedia Learning, which provided a theoretical lens. What is understood about ICT in education is made clear by the literature. The chapter covers the types of ICT tools utilized, as well as what teachers know about it and how to use it. The research supported the idea that teachers' inability to incorporate ICT into their lessons is due to a lack of preparation and expertise.

Chapter three describes the research strategy and techniques used to investigate Grade 1 teachers in knowledge and use of ICT in selected North West former model-C schools. The qualitative research design was employed in this study. Three former model-C primary schools were purposively selected as research sites for this study in the Ngaka Modiri Molema District. Grade 1 teachers with five or more years of experience in the grade were participants for this study. Data was gathered through observations, document analysis, and interviews. The generated data was analysed using thematic analysis.

Chapter four presented the data collected from all three data collection techniques and discussed the findings. The data collected was gathered by observation, document analysis, and interviews. Following the participant interviews, the data was further analysed and thematically evaluated. Three themes emerged: ICT tools used by grade 1 teachers in former Model-C schools, the use of ICT by grade 1 teachers in former Model-C schools, and Grade 1 teachers' knowledge on the use of ICT. The three themes are examined, and these emerging themes are explained using the Cognitive Theory of Multimedia Learning. The results show that Grade 1 teachers are not given access to ICT tools and resources by schools. The results also show that Grade 1 teachers were not trained in the integration of ICT into the classroom. Consequently, there is lack of understanding on how to use ICT.

Chapter five summarizes the results and makes recommendations based on the study's research questions. Three objectives and a significant discovery about the study's primary goal are covered. The chapter makes suggestions for more research, outlines the limits of the study, and makes recommendations.

1.11 Chapter summary

This chapter included the introduction and background on ICT in education, followed by the discussion of the problem statement and formation of research questions and objectives. Furthermore, the significance of this study was addressed, and the chapter ended with the presentation of all the chapters in this study. Theories and literature on ICT in education will be discussed in the next chapter.

CHAPTER 2: REVIEW OF THE LITERATURE

2.1 Introduction

The previous chapter outlined the background of the study, problem statement, aims and objectives, significance of the study as well as limitations and of the study and provided an overview of chapters. The purpose of chapter 2 is to explore literature review relating to the study. The literature review describes Cognitive Theory of Multimedia Learning (CTML) as a theoretical lens that underpins this study. This chapter also focus on literature on Early Childhood Education (ECE) and how Grade 1 subjects are taught using ICT.

2.2 The Cognitive Theory of Multimedia Learning (CTML)

The study was underpinned by the Cognitive Theory of Multimedia Learning (CTML) developed by Richard E Mayer in 1997. The CTML stresses that learners learn best when various media are employed during teaching and learning (Mayer, 1997). This theory is based on three assumptions: dual channel, limited capacity, and active processing (Rudolph, 2017). Combined, all three assumptions under the CTML assisted with examining the knowledge that Grade 1 teachers have in terms of using ICT in their classrooms.

Richard Mayer's principle and model of multimedia design was brought about after conducting many experiments on students at the University of California, Santa Barbara in the Psychology Subject Pool (Reed, 2006). During his instructional multimedia experiments, Meyer tested various types of cognitive constraints on multimedia learning. During the experiments, learners were divided into different groups. When the multimedia pieces were concluded, the students were tasked with answering questions that measured the retention of what they learned.

The theory is built on the work of Baddelev's theory of working memory, Sweller's theory of cognitive load and Palvio's dual coding theory. CTML is a cognitive learning theory,

therefore it falls under a great framework of cognitive science and information processing model of cognition. Cognition can be defined as perceiving and knowing (Sorden, 2007). Cognitive scientists attempt to know mental processes like perceiving, thinking, remembering, learning and understanding language like the ability of a Grade 1 learner being able to read as an early literacy skill (Stillings et al., 1995). Therefore, cognitive science may be used to gain insight on human nature, particularly on how people can use ICT tools to improve teaching and learning in Grade 1 classrooms.

2.2.1 Three multimedia assumptions

Mayer (1997) states that CTML consists of three aspects that assists teachers to teach learners more effectively, and they are dual channels, limited capacity, and active processing.

Dual channel emphasises that learners have two channels for information processing: audio and visual (Yana, 2007). It stresses that learners learn best with words and pictures than with words alone. This is also referred to as the multimedia principle. The term “multimedia” became popular in the 1960’s, referring to the combination and use of few jamedia such as text, still images, video and audio (Vincent & Shepers, 1989; Lowe, 2003; Tufte, 1990). According to Schnotz and Lowe (2003), multimedia refers to the combination of different technical resources aimed at presenting the information that is represented in multiple formats via multiple sensory modalities. Multimedia may allow Grade 1 teachers to integrate numerous ICT tools such as grammar games, graphics and animation, all in one package, to teach Literacy, Numeracy and Life Skills in Grade 1 classrooms. The combination of various media such as ICT tools will assist learners to learn more effectively because of the use of various sources such as images and words (Mayer, 2009). The multimedia principle allows the Grade 1 teacher to demonstrate complicated processes when teaching literacy in a highly interactive, animated manner with the use of ICT tools, such as PowerPoint, thus reflecting the ICT knowledge they have.

Schuler, Scheiter, and van Genuchten (2011) argue that there is a need for researchers to have a rationale for using the Cognitive Theory of Multimedia Learning. Similarly to Gargon et al. (2020) and, Mulder et al (2020), the researcher used the Cognitive Theory

of Multimedia learning so that it can guide this study to answer the main research question, “What is Grade 1 teachers’ knowledge and use of ICT in selected North West former Model-C schools?” Sousa (2017) and Rudolph (2017) both argue that CTML is rooted in three assumptions: the dual channels, limited capacity and active processing. The dual channel enhances the teachers’ use of multimedia ICT such as computers, games, projectors, cameras, and audio systems (Ibrahim, 2020). This aspect of the CTML allows the researcher to understand Grade 1 teachers’ knowledge of using ICT through observations. Grade 1 teachers need to select the multimedia or ICT tools that align with Cognitive Theory of Multimedia Learning principles. For example, a Grade 1 teacher might choose video content that combines both visuals and narration, avoiding slides that are text heavy. This suggests that teachers would have the knowledge of selecting appropriate and effective ICT tools for their teaching and learning.

The second assumption is based on limited capacity (Sweller, 1998) and suggests that there is a certain limit of information each channel, both verbal and visual, can take. The learners’ brain can only process selective incoming sensory data into working memory. Rudolph (2017) suggests that this is a key issue to consider when teachers design learning content using multimedia. Similarly, Sousa (2017) argues that since learners can only process a certain amount of information at a time, the information presented to the learner must not contain unnecessary content. This process highlighted Grade 1 teachers’ knowledge of selecting the rightful ICT tools for specific content. Teachers should then be able to use their knowledge of technology to select relevant ICT tools to integrate in class which will not cause cognitive overload, thus allowing the researcher to assess the teachers’ knowledge of using ICT tools effectively.

The last assumption of the CTML is active processing which requires the learner to actively select, organise and integrate the information being presented with their prior knowledge (Mayer, 2009). When learners can select relevant information presented through appropriate ICT and integrate it with their prior knowledge, learning takes place (Ibrahim, 2020). What is central to the learners’ understanding of the information presented is that the multimedia used should be presented with minimal cognitive load. Therefore, in CTML, teachers play a significant role in making sure that the ICT tools they use are appropriate and can present the content in an effective and efficient way for

learners to learn. Whether teachers can do that or not will highlight the level of ICT knowledge they possess and ultimately respond to this study's research question. Multimedia simplifies the learner's interaction with the content material because of various ICT tools such as video and audio (Sousa, 2017). They further argue that it promotes learner autonomy, shifting the learning responsibility from the teacher to the learner. This implies that through manipulation of various ICT tools, when learning subjects such as Literacy, Mathematics, and Life Skills, the learners can construct their own knowledge and be active participants in their learning. This reflects the constructivism approach in class, moving from the teacher-centred to learner-centred approach. In this way, it will be easier for Grade 1 teachers to assist learners with the basic knowledge and skills because they would become active in knowledge construction.

2.2.2 Principles of CTML

This aspect emphasises that each channel has a limited capacity of processing the information. In simple terms, learners can only process information in limited amounts, and they try to understand the information by creating mental representations from the information sources (Yana, 2007). As Rudolph (2017) suggests, this is an important factor that multimedia instructional designers and instructor (teachers) should be aware of. Teachers should ensure that they do not cause intrinsic and extraneous cognitive load in learning when using ICT to teach Grade 1 subjects. Intrinsic cognitive load is caused by the immanent complication of information that learners should have and highlights the difficulty level of the material to be learned (Meyer, 1996). Extraneous cognitive load, on the other hand, has little to do with the content material to be learned; this includes presentation methods or any unnecessary information that forces the learner to pay attention to many sources of information at the same time (Jiang, 2017). Examples of extraneous material may include animations flying on the screen, background music and detailed texts on the screen. Although multimedia learning allows teachers to teach using different ICT tools with both images and sound, Grade 1 teachers should guard against extraneous cognitive load. This is because the more energy that learners use by giving attention to the extraneous material, the less energy they will use in trying to engage with and learn the required material for literacy or mathematical skills to develop. It should also be noted that learners in the Foundation Phase, especially in Grade 1, possess a short

attention span; therefore, much of the learners' attention should be spent on learning the required educational material like sentence construction in literacy, rather than on irrelevant information.

Mayer (2008) states that for deeper and meaningful learning to occur, learners should be able to engage their cognitive processes which allows them to select, organise, and integrate the information that is in verbal and visual form, based on their prior knowledge. Although ICT may assist learners to learn more effectively because it transmits information in two channels, learners are not passive during this process (Mayer, 2008). Learners will need to actively engage with the new information, selecting the relevant material and organising it into visual or verbal models and integrating it with their prior knowledge (Mayer, 2009). He further argues that learners are not empty vessels. The CTML is against information transmission to learners and supports the learner-centered approach where learners are actively constructing knowledge. This is relevant to this study as the use of ICT by Grade 1 teachers to teach Literacy, Numeracy and Life Skills will enable learners to manipulate ICT tools and construct their own knowledge. Furthermore, the act of reading and writing as basic literacy skills are practical processes that requires the active participation of the learner. Therefore, CTML proves to be most relevant for this study. Figure 2.1 below shows how a learner's memory works in multimedia learning.

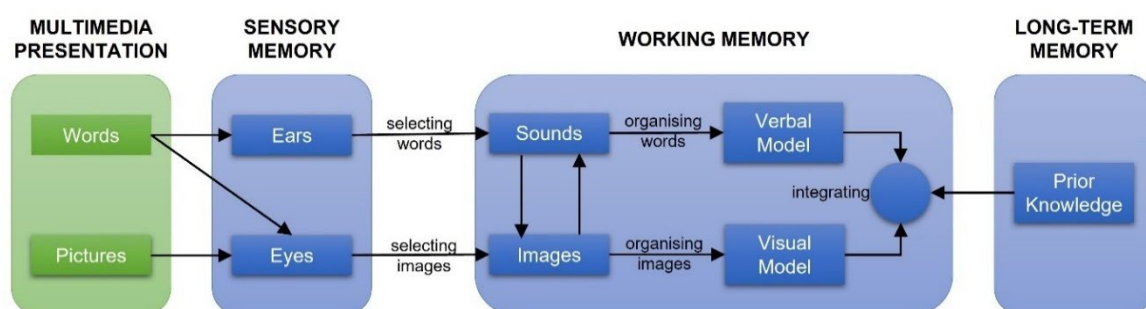


Figure 2.1: The cognitive theory of multimedia learning (adapted from Mayer et al., 2001:190)

Figure 2.1 represents the CTML Model in the learner's memory. On this figure, there appears to be two rows and five columns of boxes with arrows connecting them. These boxes are the representation of memory stores and that is sensory, short-term, and long-term memory (Mayer, 2001). The multimedia in a form of pictures and words enter the sensory memory via the eyes and ears. The sensory memory permits pictures to be registered in the eyes and held as visual images in a visual sensory memory for a short period of time. The text is then processed in the visual channel before moving to the auditory channel. Spoken words together with the sound would then be registered in the ears and held as auditory images in the auditory sensory memory for a short time. The central learning of multimedia occurs in the short-term memory where knowledge is held for a short period of time. The two sections divide the short-term memory, being the visual and auditory.

The left side of Figure 2.1 is a representation of raw material which are in a form of sounds (words) and images (pictures). The arrow from sound to images signifies the mental conversion of visual image into sound image. The right side of figure 1 shows knowledge construction of both visual and verbal mental models and how the two link (Mayer,2001). There are arrows labelled 'selecting', 'organising' and 'integrating' which represent the foremost cognitive processes required for multimedia learning. The last box is labelled 'long-term memory'. The arrow moving from long-term to short-term memory signifies the knowledge that a learner has gained that must actively be brought to short-term memory for the learner to actively think about it in long-term memory (Mayer, 2001). During this cognitive process of integrating, the learner mentally connects the verbal and pictorial models as well as the applicable prior knowledge from the long-term memory.

2.3 Teachers' experience of Information and Communication Technology

Early Childhood Education has received a lot of attention (Willman, 2017). Studies believe that ECE can improve people's lives globally. Hannaway (2016) maintains that the future of any country lies on children and youth well-being. Investing in children will yield positive results such as future peace, security, stability, democracy, and sustainable development. The interest in ECD has also been endorsed by UNESCO (2001). This

implies that it is significant to provide learners, in their early Grades such as Grade 1, with fundamental skills, like digital skills, to survive in the 21st century and contribute to the global community.

In South Africa, the Education White Paper (2001:07) explains Early Childhood Development as “a comprehensive approach to policies and programmes for children from birth to nine years with active participation of practitioners, their parents and caregivers.” ECD in South Africa includes pre-Grade R programmes, Grade R programmes and Foundation Phase (Grades 1–3). The Diagnostic Review of ECD was conducted in the year 2012 through the National Evaluation Plan that was aimed at establishing the groundwork for the development of ECD policy and programme (Hannaway, 2016). The findings of the report revealed many risks that are encountered by children and indicated that the services were unable to promote their best to strengthen the above-mentioned problem, thus the program “Strengthening Foundation Phase teacher education” was implemented by the Department of Higher Education and Training (DHET). The specific aim of this programme was to provide improved FP teachers by reinforcing the higher education system capacity.

Clearly providing quality ECE to children has many benefits. Such benefits may include higher educational achievements, increased rate in primary school enrolment, low school dropouts and better future career opportunities (Hannaway, 2016). In acknowledging the benefits and importance of ECE of any country like South Africa, it is necessary that the education received by these young children should be the type that will equip them with the demands of the current 21st century. This study focuses on Grade 1 teachers’ knowledge and use of ICT in selected North-West former model-C schools. Incorporating ICT in early Grades will equip learners with the digital skills that will enable them to survive in a digitally demanding 21st century.

2.4 Teachers’ use of Information Technology and Communication (ICT)

Recently, the use of ICT in education has been accepted as an integral part of the Education (Zaranis, 2020). UNESCO (2015) advocates for the use of ICT in education,

stipulating that ICT has the ability to extend educational opportunities and pointing out the transfer of knowledge through ICT tools has proven to be beneficial for teachers and learners. Various studies conducted concur that ICT has the ability to improve the educational outcomes of any particular subject such as Literacy, Mathematics and Life Skills (Gronoud et al., 2016; Hannaway, 2016; Cassim, 2020; Mahlo, 2020; Venketsamy et al., 2022). Subsequently, curriculum documents include the significance of ICT and encourage teachers to integrate it in their teaching (Mmolawa, 2015). As a result of the different ICT tools available and their integration in particular subjects, a thorough knowledge of these ICT tools is expected of teachers. This study is important as it will investigate Grade 1 teachers' knowledge and use of ICT as per the curriculum documents, that is CAPS. If teachers have the required knowledge and use ICT effectively in their teaching and learning, they can address learning barriers experienced by learners. Fauziya (2018) also identified the advantages of using ICT in education, particularly in ECD. He mentions that the integration of ICT on learning can improve learners' development and verbal and non-verbal skills, problem-solving, long-term memory abstraction, and structural knowledge. Similarly, another study undertaken by Van Scoter and Boss (2002) highlighted that ICT can enhance learners' literacy in four areas such as speaking, listening, reading and writing. Farjiyah and Fauziyah (2018) support that ICT combines pictures, words, and sounds together which can assist learners communicate their ideas, thoughts, and feelings. This idea of learning is in conjunction with the assumption of Multimedia Learning Theory that underpins this study.

According to Tarus et al. (2015), ICT has the potential to transcend time and space in such a way that it allows the process of teaching and learning to take place at any time of the day without any limitations. Furthermore, ICT can allow teaching and learning to take place even when teachers and learners are separated by time and space. This is beneficial in times like global and national pandemics such as COVID-19 in 2020. Teachers with the required knowledge of ICT were able to continue with the teaching and learning of Literacy while learners and teachers were at home.

2.5 The importance of ICT in Early Childhood Education

In this digital age, children interact with various digital ICT tools in their lives and end up becoming competent users of such tools. Children use digital devices such as tablets, computers, video games and communication-based devices without any formal guidance from adults (Nikolopoulou, 2020). According to Prensky (2001), these children are defined as “digital natives” meaning that they are born after the advancements of the digital technology; those who were born before this era are known as “digital immigrants”. In this case, teachers may be referred to as “digital immigrants” because several of them were born before digital technology became advanced. It is therefore possible that they may be struggling to adapt and keep up with the current changing technologies (Mpiti & Makena, 2020). It is thus important that Grade 1 teachers become knowledgeable with the changing technologies to enable them to use ICT in their teaching and learning process.

Moreover, education sectors around the world are focused on the digital literacy development of their children as a skill that is highly required in the 21st Century (Ayodele, et al., 2020). The Medicine and National Research Council (2015) highlights that the events in the earliest ages of the child plays a very important role in shaping the child’s educational outcome. Therefore, if a country wants to shape the education of its nation, it is best to lay a proper foundation in the ECE. Using ICT in Early Childhood Education assists with learners’ self-directed learning or learner efficacy, boosts their self-esteem and improves their fine and motor skills. Integrating ICT in ECE also appears to be a strategy that can be employed to promote parental involvement in learners’ education (Howard et al., 2012). Studies also indicate that through ICT, learners in ECE feel empowered as they are provided with a voice they never had (Luna, 2015; Nikolopoulou, 2020; Belle et al., 2021). Some learners in the ECE, such as Foundation Phase, in the South African context are still shy and hesitate to communicate. Therefore, with the use of ICT tools, learners may find alternative ways to communicate effectively without getting shy and thus changes learner-to-learner and teacher-to-learner interactions.

In Europe, ICT utilisation in Early Childhood Education is regulated by the Structure of Developmental Appropriateness of Technology in ECE (Ayodele et al., 2020). The

structure outlines the suitability and practice of the digital devices in ECE. Using ICT in Early Childhood Education should be both educational and stimulating. It should encourage teamwork amongst learners. ICT in Early Childhood Education should also focus on play-based pedagogy. This implies that although ICT is important in Early Childhood Education, it should not take away the child's need to play.

Moreover, there are concerns regarding ICT in Early Childhood Education. For instance, Avodele et al. (2020:22) suggest that children between ages two and five should not be allowed screen time due to "screen addiction". Children who are five years and older should be allowed to use digital devices for one to two hours daily (Avodele et al., 2020; Fajiray & Fauziyah, 2018; Dakin & Chung, 2017). According to Toomey (2013), ICT can cause dependency and ultimately lead to ill-discipline in children, which eliminates educational goals. Although concerns have been raised regarding the use of technology in Early Childhood Education, adults should monitor children's use of ICT and provide assistance to ensure that they use technology wisely and things that are feared do not occur.

2.6 Teachers' knowledge of ICT usage in teaching and learning

According to Koh et al. (2015) teachers must understand the Technological pedagogical and content knowledge (TPACK) model as they include technology-knowledge lessons to improve the 21st century learning which is still lacking amongst many teachers. The TPACK model is not a theoretical framework in this study. However, it is important to unpack it as it explains the general Technological knowledge that teachers should have when using technology in their lessons. At the core of this TPACK model is the complex interplay of three forms of knowledge: Content (CK), Pedagogy (PK), and Technology (TK). The TPACK approach goes beyond seeing these three knowledge bases in isolation. CK is the teacher's knowledge of the subject matter, or subject such as Numeracy or Life skills in this study's context. PK is the teacher's pedagogical knowledge, understanding how to deliver the content to learners, and knowing how students learn (Koehler & Mishra, 2009). PCK is used to "describe how teachers' understanding of educational technologies and PCK interact with one another to produce effective teaching

with technology” (Koehler & Mishra, 2009:62). Furthermore, TCK is “an understanding of the manner in which technology and content influence and constrain one another.” Teachers should know which technologies or ICT are best suited for a particular subject like Numeracy. (TPK) is “An understanding of how teaching and learning can change when particular technologies are used in particular ways” (Koehler & Mishra, 2009:63). The TPACK framework focuses on how teachers connect their technological, pedagogical, and content knowledge (Thompson & Mishra, 2007). According to Archambault and Crippen (2009:7), “TPACK involves an understanding of the complexity of relationships among students, teachers, content, technologies, and practices.”

Teachers must have the knowledge of including technology into their lessons (Powers & Blubaugh, 2016). Furthermore, they must be able to develop educational activities that are appropriate for different learning situations. It is not sufficient for teachers to only understand the ICT tools such as computers and smartphones; they must be able to integrate them in their lessons (Mukhari, 2016). Karaca (2015) is of the opinion that teachers must follow and learn about the latest technologies and apply them in classrooms.

Consequently, knowledge of operating systems is important for teachers to progress with the delivery of the ICT knowledge in connection with the subject matter like Literacy or Numeracy. Although it is evidently important for teachers to have the Technological Knowledge (TK), research suggest that teachers’ critical pedagogical skills for integrating technologies is needed. In a study conducted by Molotsi (2014), findings revealed that teachers failed to effectively integrate ICT tools in their lesson presentations. This is echoed by Mollo (2019) after uncovering that, teachers lacked the competency in ICT, to use resources like computers, tablets, smartphones and other applications in their pedagogical practice. In a study conducted in the United States of America, Willmann (2017) found that lack of ICT knowledge amongst teachers is a barrier that impacts technology integration. Teachers were regarded as digital immigrants because they need to catch up with new and advancing technologies each year.

Lack of Technological Knowledge and skills appears to be one of the major contributors to the absence of ICT integration in teaching. Mpiti and Makena (2020) report that the

lack of TK is one of the common reasons provided by teachers for not using ICT in their lessons. Findings from Venketsamy and Hu (2022) further suggest that although schools may have ICT tools and resources, teachers are not using them as they lack the knowledge to integrate them. Participants from the study emphasised that they do not mind using technology in teaching their foundation phase classroom, but they need to be capacitated with the appropriate knowledge and skills to do be able to do so (Venketsamy & Hu, 2022). Koehler and Mishra (2008) support that teachers must be capacitated with the required technological pedagogical content knowledge to enable them to successfully integrate technology in their teaching. Vandeyar (2013) also advocates for teachers to receive appropriate and relevant training to integrate technology in their classrooms. Teachers are significant role players in the implementation of technology in the 21st century classroom (Hennessy et al., 2015). Therefore, it is imperative that they receive ongoing teacher training development. It is evident that teachers' use of ICT in teaching is dependent on the technological knowledge they possess. It is then important that this study explores Grade 1 teachers' knowledge and use of ICT in their classrooms.

2.7 The use of ICT in teaching Grade 1

Basic literacy skills such as reading and writing relate to every aspect of the curriculum. This, coupled with the fact that literacy determines the academic performance, emphasises the significance of providing learners with quality emergent reading and writing skills, in their early schooling (Voogt & McKenney, 2008). Therefore, ICT has proven to enhance literacy in the ECE. Using ICT in the curriculum has been widely supported by many studies. Belle et al. (2021) suggests that ICT has various benefits when used to teach literacy. He suggests that ICT can allow teachers to produce as well as modify resources very easily and quickly. Furthermore, it allows for access of different forms of information (Avodele et al., 2020). ICT tools such as computers, software and other tools may be used to make literacy teaching effective and fun for learners in the Foundation Phase. Some of the studies conducted proved that ICT is beneficial to the improvement of basic literacy skills such reading and writing (Venketsamy, 2019; Mpiti & Makena, 2020). It has also been proven that teaching literacy using ICT promotes

interactivity amongst learners in the classroom. As a result, this interactivity promotes collaborative learning (Belle & Seerauj, 2021). With some tablets connected to the internet and webcam, the teaching of literacy in the Grade 1 can even take place remotely. In this way, learners may discover their resources and control their learning. This will promote a learner-centred approach, as stressed in the CTML theory (Meyer, 2008).

Willmann (2017) conducted a study on the importance of ICT on Early Childhood Education and the results confirmed that ICT improved learners' reading skills. The participants highlighted that they were integrating technology in their teaching of literacy. The use of programs such as Accelerated Reader, ThinkCentral, and ScootPad were the ICT tools that the teacher participants identified as beneficial in promoting reading. Similarly, Belle and Seerauj (2021) report that using ICT addressed reading barriers by teaching reading through games. Furthermore, ICT is believed to intensify children's reading by captivating their attention (Alobaid, 2020). For example, learners in the FP may be exposed to multimedia such as sound, music, pictures incorporated into a story, thus making them eager to read the computer screen. According to Moureen et al. (2018), digital technology can assist with children's literacy skills. This is fostered by learners learning new vocabulary and being able to identify letters of the alphabet from the keyboard or an electronic program.

A study conducted by Hans (2018) on the influence of electronic books (e-books) increased learners' literacy skills in Early Childhood Education. The study targeted the learners' early language skills such as word meaning, listening, print awareness and phonological awareness. The results indicated that the use of e-books had a positive impact on the learners' phonological awareness but had no impact on word meaning. It is suggested that in order to use e-books effectively, teacher guidance is essential. In a different study, AlNatour and Hijazi (2018) uncovered that using electronic games has positive impact on teaching young learners' new vocabulary. If learners in Grade 1 have rich vocabulary, it is often easy for them to construct sentences and become independent writers.

As much as ICT may be beneficial for the learning of literacy skills, research suggests that it can be used as an intervention strategy for learners who are struggling to read and write (Balcaza, 2014; Morrisroe, 2014; Mphahlele & Nel, 2018). Marrisome (2014) suggests that the goal for learners who experience difficulties are poverty, crime and unemployment. Therefore, it is necessary to use technology as an intervention strategy to ensure that learners stay in school. Mosito, Warnick and Esambe (2017) uncovered that reading-to-speech technology, supportive e-text and electronic books can enhance the reading abilities of learners with barriers.

Similarly, Mpiti and Makena (2020) advocate for the use of technology as an intervention strategy in the Foundation Phase. This is supported by the results from a study they conducted using technology to assist learners with writing difficulties. Findings revealed that learners were enthusiastic about the use of ICT on writing. Learners, from the study by Mpiti and Makena (2020), expressed that learning to write with technology assisted them to do better. Similarly, Alobaid (2020) undertook a study on the use of multimedia ICT tools such as YouTube on learners' writing process. The results revealed that ICT multimedia technology is highly recommended for the improvement of writing on young learners. The use of YouTube videos is proven to be beneficial because during film viewing, spoken words may include captions or subtitles which exposes learners to how words are written, thus increasing their vocabulary. This proves the Cognitive Theory of Multimedia Learning regarding dual channel (Mayer, 2009). The CTML theory suggests that teachers should guard against cognitive overload when using Multimedia such as YouTube because it contains both speech and texts. Therefore, it is highly advisable that captions are used sparingly when using ICT tools such as YouTube to teach in Grade 1.

Mathematics is both a scientific and behavioural discipline, therefore every country has integrated it as a compulsory subject in their education (Joshi, 2017). Despite this, Mathematics remains one of the most underperforming subjects in schools (Abdul-Razak, 2020). The Southern and Eastern Consortium for Monitoring Educational Quality (SACMEQ) endorses that the South African education system needs to be fixed and this includes the adoption of an e-skills plan to assist improve the quality of mathematics teaching and learning (Vadachalam & Chimbo, 2017). Researchers agree that learners experience Mathematical difficulties due to insufficient development of mathematical

thinking in their early years. Therefore, it has become obvious that integrating ICT in early grades has a positive impact towards learners' Mathematical performance.

Das (2019) conducted a study on the role of ICT for better Mathematics teaching. This study revealed that by using ICT in Mathematics classrooms, teachers can maximise the impact of ICT in Mathematics education. Using a computer, learners are taught to work collaboratively while solving problems. Furthermore, Joshi (2017) found that ICT assisted with increasing learners' critical thinking and analysing skills in the mathematics class. ICT also assists students in observing patterns, seeing connections, developing visual imagery, and exploring data (Becta, 2008). It was maintained that a Mathematical software, GeoGebra, makes teaching Mathematics significant, easy, pleasant, funny and practical and increases learner attendance.

Zaranis (2017) investigated if ICT helps to improve first grade students' basic Geometry achievement regarding circles, triangles, rectangles and squares. To test this, students were divided into two groups where one group was taught using the computer-oriented curriculum and the other group without the computer-oriented curriculum. The results of the study indicated that teaching and learning through ICT is an interactive process for learners at grade 1 level and has a positive output for the learning of circles, triangles, rectangles and squares.

2.8 ICT tools used by teachers in class

There are many benefits for using ICT tools in the teaching and learning process. ICT tools enable both teachers and learners to access information in different formats (Jenkin, 2010; Dube et al, 2018; Venketsamy & Hu; 2022). Computers, software, cameras and other ICT resources make learning fun and enjoyable for learners. However, ICT tools available to teachers vary, hence there is a need for judgements to be made about which ICT tools to use, for which subject and activity. This study strives to identify which ICT tools teachers use to teach in Grade 1. The following section discusses different tools that are used by teachers in classrooms.

Interactive whiteboards (IWB)

IWB allow learners to engage in shared and public speaking. When learners engage in talking through a normal way, they find it difficult to remember the details unless they are recorded in some way. Teachers and learners can record their work done in class then project it on the IWB so that they can reflect and comment on factors such as language use, and improve that (Jenkin, 2010).

E-Books

E-Books are books that can be shown and read from an electronic device inside a classroom rather than being printed on paper, like during the traditional method of teaching (Azelin, Hashim & Shaari, 2012). The e-books can be traditional books that are read on the digital device, or they can be interactive in a manner that learners listen to the voice reading the book (Johnson, 2014). According to Wang, Lu and Lee (2011) using e-books in an interactive way can assist learners who are struggling to read because this practice may provide them with the opportunity to read along to improve their vocabulary. E-books have different features like user-friendly functions, attractive graphics, enlarged text size and plug-in speakers. These features support inclusive classrooms and make reading lessons varied and fun, to attract learners as the use of ICT should do (Venketsamy & Hu, 2022).

Google maps

Google maps allows both teachers and learners to explore geographic locations anywhere in the world, showing satellite images and aerial photographs (Karaburun & Kilar, 2013). According to Landicho (2020), google maps are a useful tool in teaching and learning. This is because google maps allow learners to view close-up images of geographical and provides teachers and learners with the opportunity to visualise different countries and continents in subjects such as Life-Skills in Grade 1. Google maps is a teaching and learning tool that has the potential to be engaging and enriching in classrooms (Mahlo, 2020).

Microsoft PowerPoint

Another important ICT tool to be used in education is the presentation software called PowerPoint. PowerPoint enable teachers to create presentations that integrate words, images, sounds and videos (Reich & Daccord, 2015). According to Sankey et al. (2010), learners learn best when information is presented by combining both words and images than with words alone. This resonates with the CTML theory that underpins this study. Therefore, the use of PowerPoint in Grade 1 classes may enhance the learners' understanding of the content taught. Reich and Daccord (2015) suggest that when using PowerPoint in class, teachers can present the content using a projector or IWB and engage learners by asking them to interpret or analyse the images shown. This assist learners to concentrate and think clearly to participate in the lesson. Research suggests that the use of ICT in teaching and learning assists teachers as they save time and are able to attain learning outcomes easily (Sahin-Kizil, 2014; Daccord, 2015; Mukhari, 2016). For instance, teachers can save time by preparing key points in advance using slides on PowerPoint and display them on the screen, instead of writing them on the board.

YouTube

Indrasari (2015) sees YouTube videos as a valuable teaching tool in teaching and learning stating that learners tend to pay more attention when videos are displayed in class. Videos can be used to improve learners' writing skills. Indrasai (2015) advises that learners can watch a story with good quality sound and visuals, then the teacher can ask them to summarise the short story in their own words. YouTube videos also assist learners with learning a second language as they can watch videos to learn new vocabulary, language structures and skills (Kabooha and Elyas, 2015). Moreover, these authors indicate that the use of YouTube minimises the level of anxiety amongst these learners if some of them are unfamiliar with the language being taught. Mayer (2009:85) defines a "multimedia environment as one in which material is presented in more than one format such as in words and pictures." YouTube videos present the information in both words and pictures, thus enhancing the learners understanding as the CTML suggest.

Video conferencing

Video conferencing is an ICT tool that enables users to use visual and audio features synchronously (Al-Samarraie, 2019; Hoper, 2014). Users at various places can connect using the internet, enabling them to both see and hear one another. Liu and Xu (2020) identify four common video conferencing tools as Skype, Zoom, Microsoft Teams and WhatsApp. Al-Samarraie (2019) acknowledged the value of video conferencing in education as maintaining effective communication between both teachers and learners. It is further suggested that this is more useful when face-to-face meetings are impossible due to challenges such as Covid-19. Video conferencing creates teaching and learning opportunities in the many ways. Learners can exchange ideas and resources in a collaborative way. It affords learners the opportunity to acquire communication skills because they could actively engage with peers and teachers (Al-Samarraie, 2019:133). Using ICT tools, learners could connect with new people and improve their language use. It is worth noting that video conferencing can enable teachers to connect with the classroom next door or ‘virtually’ bring in an expert in the classroom to enhance the learners understanding of the concept taught. This will be more effective if teachers have the ICT knowledge to manipulate such as effective ICT tool.

2.9 ICT Policy in the South African education system

The DBE and provincial departments regard ICT as a tool for school reorganisation and whole school development (DBE, 2008). To respond to this, the DBE implemented the White paper 7 on e-Education (DoE, 2004). It states that e-Education “revolves around the use of ICTs to accelerate the achievement of national educational goals” (DoE, 2004:14). The implementation of the White paper 7 was delegated to the nine educational provincial departments. The response from the departments was to begin with getting physical technologies into schools. This was seen as progress towards attaining one of the outcomes of the White paper 7. Various ICT pilot projects, connectivity to schools and computer literacy symbolised the beginning of e-Education policy in South Africa (Sadeck, 2016).

The e-Education policy has been in place for more than ten years now, but to date, (2022) there has not been much progress in the implementation of the policy (Tshimaneka et al., 2022). One of the strategic objectives of the e-education policy is that “every teacher and learner in General and Further Education and Training must have access to ICT infrastructure” (DoE, 2004:29). Studies conducted indicate that many marginalised schools still lack ICT resources (Nkula & Krauss, 2014; Dube, 2020; Munje & Jita, 2020). A recent study conducted by Venketsamy and Hu (2022) indicated that North-West province was amongst the three provinces with the least number of primary schools with access to computer labs with internet connectivity. This proves that the DBE still lags behind in terms of providing ICT resources to schools. Subsequently, this inhibits teachers from using ICT in the teaching and learning process.

Moreover, it is important to note that for ICT to be used effectively in teaching, teachers must have the knowledge and skills to integrate it (Mukhari, 2016; Tabata, 2020; Dube & Mogande, 2018). This study explores Grade 1 teachers’ knowledge and use of ICT in selected North-West former Model-C schools. To assist teachers with the ICT knowledge and skills, the policy states that “a programme that urgently addresses the competencies of teachers to use ICT for their personal work, in their classrooms, must be developed” (DoE, 2004:29). This implied that teachers would receive ongoing professional development on the use of ICT.

However, several studies conducted after the implementation of the e-Education policy suggest that teacher training in the use of ICT is still lagging behind (Johnson, 2015; Tiba, 2015; Umugiraneza et al., 2018). Although some ICT tools may be supplied to schools, this does not guarantee that teachers are going to integrate them in their teaching if sufficient training is not provided. De Silva (2015) and Tiba (2018) observed that in cases where training is provided, it is insufficient as teachers are only trained once without follow up sessions. To achieve the e-Education policy, there is a considerable need for teachers to receive continuous training to capacitate them with the kind of knowledge needed to use ICT when teaching.

Furthermore, CAPS aims to produce learners who can use science and technology effectively and critically showing responsibility towards the environment and the health of

others (DBE, 2011:05). What the e-Education policy and CAPS lack is specifying the necessary details on how teachers can practically implement ICT into different subjects. The DoE (2004:41) highlights that “the research and development community must continuously assess current practices, and explore and experiment with new technologies, methodologies and techniques that are reliable and will support teachers and administrators in e-learning and e-administration”. Therefore, it is important for this study to be conducted as it will explore how Grade 1 teachers use ICT in their teaching and learning and establish the ICT tools available to teachers in a developing country like South Africa.

2.10 School based ICT policy

ICT policy planning in education exists in various levels; national and provincial departments, and districts can develop ICT policies which provide how ICT integration in education should look (Fishman & Zhang, 2003; Jones, 2003). In South Africa, the e-Education policy is an example of a national policy planning which outlined how education with ICT should entail (DoE, 2004). Furthermore, several authors have voiced that developing a school-based ICT policy is a good attempt to ensure that ICT is integrated in schools (Vanderlinde et al, 2010; Makwela, 2019; Mahlo, 2020). School based ICT policy is defined by Van Braak (2003) as a school document that contains various elements pertaining to integration of ICT in education. Within the school-based ICT policy, the school describes its expectations, goals, content and actions that are related to using ICT in education. According to Baylor and Richie (2002), the contents of a school-based ICT policy acts as a guideline for the sequence of events the school aims to achieve, describes the overall philosophy of ICT and analyses how ICT would improve teaching and learning. Vanderlinde et al. (2010) suggest that a school-based ICT policy should include aspects such as vision for using ICT in classroom, stakeholders’ professional development in ICT, hardware and software to acquire and support, and funds to allocate. This implies that Grade 1 teachers should consult the school-based ICT policy for the successful integration of ICT in their classroom.

Since the school-based ICT policy is decentralised to cater for the needs of the individual schools, teachers, school principals and ICT coordinators' participation in the implementation of the policy is mandatory (Rahim, 2016). Furthermore, the benefit of actively involving teachers in the process of designing ICT policy at school level is that it can provide a vision of how all employees can benefit from such change and vision (Ozma, 2011). A study which confirms this argument was conducted by Makwela (2019) whose findings suggested that teachers in some primary schools reported that they were motivated to use ICT in their classrooms because of their involvement in the ICT policy design. It appears that if teachers feel that their working environment is conducive for ICT integration, then they are more likely to use ICT in their classrooms.

Although school-based ICT policy is encouraged by researchers and policy makers, policy implementation may fail due to various reasons. Absence of ICT expertise and leadership skills, poor planning for funds distribution, level of ICT provision, absence of rightful ICT training, lack of pedagogical impact, inappropriate ICT curriculum and integration, and absence of infrastructure are some of the factors that may inhibit the successful implementation of the school-based ICT policy (Rahim et al., 2016). In a study conducted by Mathipa and Mukhari (2014) in Gauteng primary schools, findings highlighted that some teachers were not using their school computer laboratories due to the absence of proper ICT policies to promote the use, and teachers were not receiving any support on how to use the computer labs. According to Dube et al. (2018), some South African primary school teachers criticised the rules that were imposed on them by the School Management Team (SMT) regarding which teachers were entitled to use ICT and for which specific subjects. It can be argued that some school-based policies designed by the SMT hinders the teachers' use of ICT in their classroom rather than motivating them to integrate ICT.

Rowell et al. (2017) are of a view that ICT policies should move away from only focusing on the number or quantity of available ICT resources available and move towards how teachers use these resources to improve the skills required for effective ICT usage in classrooms. Similarly, Graves and Bowers (2018) argue that teachers' lack of ICT capabilities should not be argued based on the availability of ICT resources at their schools, but the available information on the school-based ICT policies. Appropriate ICT

resources may be available in schools, such as former Model-C schools under this study, that are situated in affluent neighbourhoods and are fee paying schools; however, unclear school-based ICT policies imposed on teachers without consultation may prevent the integration of ICT.

2.11 Using ICT in Education (The South African Context)

It has been almost two decades since the introduction of e-Education Policy in the South African public schools. This policy was aimed at preparing learners for the 21st century demands and technology needs (DoE, 2004). The policy clearly stated that the achievement of its outcomes revolves around using ICT. Various ICT projects were conducted whereby internet connectivity was provided in schools and the training on the use of technology and computer literacy reflected the start of e-Education policy in SA (Mahlo, 2020).

In SA, teachers use of ICT varies according to the social and economic status of where the school is located (Dube, 2020). For instance, there are former Model-C schools situated in urban areas which are perceived to have resources such as computers and internet access. Teachers at these types of schools have an advantage of utilising ICT in their daily teaching and learning (Chitha, 2014; Sonkwala, 2019). The three sampled schools from this study are former Model-C schools that are believed to have resources that support the use of ICT by teachers. Mukhari (2016) found that some teachers in former Model-C schools are still behind with integrating ICT despite having the rightful equipment. Her study indicated that teachers lacked ICT training, ICT skills and confidence.

A study conducted by Nkula and Krauss (2014) on marginalised schools in South Africa revealed appalling findings with regards to ICT integration in South African education. The results highlights that there were still many schools in South Africa that did not have ICT resources even though the e-Education policy emphasised the need for ICT integration in schools. Similarly, a study conducted by Mahlo (2020) suggests that many schools in South Africa still lacks ICT resources for the effective implementation of the e-

education policy. The study also revealed that many teachers were still utilising the traditional pedagogical practices such as the textbook and chalkboards. The lack of resources deprives learners from acquiring the necessary skills to meet the 21st century demands.

It was the goal of the e-Education policy that “every learner in the general and further education phase will be capable to use ICTs effectively and be able to participate in the global community by 2013” (DoE, 2004:17). Unfortunately, that has not been the case. This goal seems to favour only the schools from the affluent areas. Studies conducted revealed that there is a lack of ICT integration in rural schools mainly because of the lack of ICT infrastructure (Nkula and Krauss, 2014; Hasjemi, 2020; Mhlanga, 2021). Additionally, Munje and Jita (2020) conducted a study on the Impact of the lack of ICT resources on teaching and learning in South African primary schools. The results suggest that factors such as insufficient funds (to buy data or repair broken computers) and theft of ICT equipment were hindering the integration of ICT in teaching and learning.

A study by Mihali (2021) highlighted that the integration of ICT in South African schools remains very low. On the average, the usage of ICT tools was as follows: the use of contextual tools was on 41%, the tools used for sharing of information were on 29%, while experimental tools were on 26% and reflective and dialogue tools on 18%. According to Hashemi and Kew (2021), the teachers’ lack of confidence to use ICT was seen as one of the barriers to the integration of ICT in education. Their lack of confidence was because of the lack of ICT training. In addition, Hadijah (2017) identified lack of time as a barrier to the integration of ICT in teaching and learning. It is maintained that teachers are required to spend more time searching for ICT tools for their lessons and ensuring that they work properly before their lesson, and this requires time. However, without proper planning the time factor may be eliminated.

Since the first COVID-19 case on the 5th of March 2020 in South Africa, nothing has been the same and that includes education. The Education sector was hit-hard by this pandemic as the control of this virus required social distance making learning difficult from primary education up to tertiary education (Mhlanga, 2021). Many schools in the country had to close for a while due to the COVID-19 pandemic. As a result, many education

officials and stakeholders were of the opinion that technology would revolutionise the education field and ensure that teaching and learning took place amid the COVID-19 pandemic (Venketsamy & Hu, 2022).

The existence of COVID-19 exposed the vulnerabilities of the education in South Africa. While learners were at home during the COVID-19 lockdown, many schools in the country utilised technology for teaching and learning. Dube (2020) revealed that many learners, particularly in the rural areas, were having challenges with receiving education during the COVID-19 lockdown in SA. His study revealed that learners in the rural areas were excluded from learning during COVID-19 due to challenges such as lack of ICT resources, internet connectivity and the absence of Learning Management Systems (LMS). The e-Education policy has been in place for close to twenty years and, to date, the COVID-19 proved that there is still much to be done towards the realisation of the outcomes of the policy. It is unfortunate to experience that even with the existence of the e-Education policy, learners' reading and writing skills are compromised.

The e-Education policy recognises teachers as important stakeholders (DoE, 2004). However, results from studies indicate that many teachers in South African education struggle with the integration of ICT in their teaching and learning of their subjects. Dube et al. (2018) suggests that teacher attitude plays a part in whether the teacher will successfully incorporate ICT into their teaching. They assert that teachers with more experience are more likely to use technology in their teachings than those with little experience. However, a recent study by Mihai (2021) revealed otherwise; the findings indicate that new teachers showed interest in using ICT as compared to teachers with more experience. Furthermore, the lack of training on pedagogical use of teachers remains a factor that inhibits teachers from using technology in the classrooms.

Ojo and Adu (2018) argue that the universities and colleges play a part in the lack of Technological Pedagogical Knowledge of teachers by not adequately training them on the use of ICT in their teaching. It is important for universities and colleges to adequately train teachers on the use of ICT in their classroom. For example, if Grade 1 teachers are adequately trained enough on the use of ICT, they would be able to use those skills to teach learners basic literacy and numeracy skills effectively. Adequate knowledge on ICT

integration would also provide Grade 1 teachers with the ability to ensure that they do not contribute to the cognitive overload of learners when using multimedia technologies such as YouTube videos.

Venketsamy and Hu (2022) suggest that not all teachers showed some enthusiasm about using technology in their classrooms. Their results confirmed results by Dube (2020), indicating that during the COVID-19, teachers lacked the necessary knowledge and skills to use ICT in their teaching and learning. As a result, several teachers in the Foundation Phase experienced stress and anxiety. This finding suggests that during COVID-19 lockdown, Foundation Phase learners' literacy skills were compromised dearly because they were not taught. Furthermore, it is possible that learners have content gaps because of missing the educational content during the COVID-19 lockdown. It is important for teachers to have the basic knowledge of integrating ICT in their lessons (Powers & Blubaugh, 2016).

When looking deeper at teachers' use of ICT, Azarfam and Jabbari (2012) believe that anxiety and technophobia amongst teachers is a significant problem. Vanketsmy and Hue (2022) describe technophobia as fear of technology or negative attitudes towards technology. Technology is growing at a very high pace and is often difficult for teachers to understand and grasp it; therefore, this causes fear and rejection when it comes to the use of ICT in the teaching and learning (Ramola, 2010). Other scholars such as Vandeyar (2013) believe that this anxiety and technophobia is caused by the fact that teachers are aware that their learners are more knowledgeable in on using technology, software, and various programmes. This is an acceptable argument because learners in schools currently are 'digital natives' who were born after the advancement of digital technology, whereas many teachers are 'digital immigrants' who were born before technology. This proves the importance of teaching learners using ICT because they would understand it better as they were born in, and live, in a digital world.

2.12 Chapter summary

This chapter explored the theoretical lens (CTML) and how it applies to on this study. The chapter also discussed ICT. Literature suggest ICT plays a significant role in education. It also exposed that it is better to integrate ICT in ECD as the first years of the child are very important. Teachers' lack of ICT knowledge also plays a contributing factor on the absence of ICT integration in classrooms. The following chapter outlines and defends the research design and methodology utilised.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides an explanation of the research methodology and design, addressing methodological aspects, research philosophy (ontology, epistemology), and research methods. It gives the study's paradigmatic perspective, explains the research strategy, and explains the selection of sample and data gathering techniques. This chapter provides details on qualitative research design to explore the Grade 1 teachers' knowledge and use of ICT in selected North-West former Model-C schools. The focus of this chapter is on the research approach, design, data collection and data analysis method utilised in the study. Measures to ensure trustworthiness and ethical consideration issues are also addressed in this chapter.

Table 3.1: An overview of the research methodology

Research methodology	Type
Research approach	Qualitative approach
Research design	Multiple case study of North-West Former Model-C schools
Paradigm	Interpretivism
Sampling technique	Purposive sampling
Data collection method	Interviews, document analysis and observations
Participants	3 Grade 1 teachers

As indicated in Table 3.1, this study adopted the interpretivism paradigm and followed the qualitative research approach. A multiple case study design was employed in addressing

this study's research questions on Grade 1 teachers' knowledge and use of ICT in selected North-West former Model-C schools. Purposive sampling was utilised to sample three Former model-C schools in the North-West province. One Grade 1 teacher was selected from each of the three schools to be participants in this study. The data was collected through semi-structured interviews, document analysis, and observations of Grade 1 teachers while teaching using ICT tools. The first phase of data collection involved interviews followed by document analysis and then observations. The data was analysed using thematic analysis. The research methodology will be explored in more details in the sections that follow.

3.2 Research approach and design

3.2.1 Research paradigm

Research paradigm is defined as frames of references utilised by researchers to organise their observations and reasoning (Bhattachertjee, 2012; Glesne, 2015). This study aims to explore the Grade 1 teachers' knowledge and use of ICT in selected North-West former Model-C schools. Therefore, the interpretative paradigm was selected to underpin this study. This paradigm highlights that reality is constructed socially (Maree, 2014); therefore, the interpretative paradigm allowed the researcher to collect data socially from Grade 1 teachers regarding their lived experiences on the use of ICT in their teaching at their respective schools. Three participants were interviewed and observed to generate data and teachers shared different experiences regarding the phenomenon under study. Such interactions broadened the horizon in the understanding in terms of the issue and concurs with the interpretative paradigm as it suggests that there are multiple realities instead of a single reality (Johnson, 2019). According to Creswell (2018) the goal of research under the interpretivism paradigm is to rely as much as possible on the participants' views of the situation being studied. This was achieved through employing the qualitative research approach and multiple case study design that allowed data to be collected from Grade 1 teachers in former Model-C schools.

3.3 Research approach

A research approach is a plan and procedures for research that spread the steps from broad assumptions to detailed data collection methods, analysis, and interpretation (Creswell, 2013). The choice of a research approach depends on the type of problem being addressed in a particular study. The researcher's personal experiences and the audience also influence the choice of the research approach (Jebren, 2012). A qualitative research approach was used in this study Grade 1 Teachers' knowledge and use of Information and Communication Technology in selected North-West former Model-C schools.

Qualitative research approach is beneficial for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The research process includes emerging questions and procedures, data usually collected in the participant's setting, inductive data analysis building from particulars to general themes. The researcher then making interpretations of the meaning of the data (Creswell, 2013). Furthermore, Hennink, Hutter and Bailey (2012) and Patton (2015) highlight that qualitative research approach brings about in-depth data on research issues considering participants' perspectives in their natural setting. In a qualitative research approach, the researcher is socially connected with participants and collects data from them. The researcher used data collection methods such face-to-face interviews to interview teachers at their different schools and observed them how they used ICT in their teaching and learning. This allowed the researcher and teachers to connect socially. This research approach is based on the ontological assumption that the nature of reality is diverse, and that reality has multiple dimensions (Creswell, 2017). Hence, the researcher employed multiple case studies on Grade 1 teachers as data was collected from three different schools. This allowed the researcher to obtain rich data from different teachers' perspectives regarding their knowledge and use of ICT.

The social interaction of the researcher and Grade 1 teachers assisted the researcher with understanding the daily struggles teachers encounter while using ICT in their teaching (Brynard, Hanekom & Brynard, 2014). This enabled the researcher to interpret and describe their actions. Apart from describing teachers' actions, Patton (2012) asserts

that the direct and social interaction with participants promotes empathy and sympathetic self-examination. These are important traits that helped the researcher understand human behaviour as qualitative research entails understanding human behaviour. Another advantage of adopting the qualitative research is that it allowed for different methods of data collection (Maree, 2014). This study used semi-structured interviews, observations and document analysis to collect data. Therefore, triangulation was reached, and it enhanced data validation and ensured credibility and rigour.

3.4 Research design

Various authors agree that a research design is a strategy that moves from an underlying philosophical assumption to specifying the selection of participants, data collection method, and data analysis (Bhattacharjee, 2012; Maree, 2014 & Creswell, 2012). Although there are different research designs under qualitative research, the following are the mostly recommended: grounded theory, ethnography, content analysis, phenomenology and case studies (Leedy & Ormrod, 2001). Case studies and phenomenology may serve the purpose of studying individuals.

The study utilised the case study research design to explore the Grade 1 teachers' knowledge and the use of ICT in selected North-West former Model-C schools. A case study is an investigative approach seeking to describe the case in depth within its real-world context (Yin, 2014). Furthermore, Creswell (2003) argues that in a case study approach, the researcher explores programme, an event, an activity, a process or one or more individuals in detail. In this study, three Grade 1 teachers were studied in terms of their knowledge and use of ICT in their teaching and learning from three different schools in the Ngaka Modiri Molema District. Since the participants involved in the study are from three different schools, a multiple case study was followed (Lapan, Quartaroli & Riemer, 2012). In a case study design, the data collection is extensive and draws from multiple sources such as interviews, participants observations, documents analysis, physical artifacts as well as audiovisual material (Williams & Canyon, 2007).

The different experiences of the knowledge and use of ICT by grade 1 teachers were tapped into through one-on-one interviews. This was achieved as the teachers were able to verbally communicate with the researcher regarding how they use ICT in their teaching and learning. Immediately after the interviews with teachers, they were asked to provide their lesson plans and Annual Teaching Plans (ATP) to corroborate the data from the interviews. As Williams and Canyon (2007) suggest, in a case study design, the researcher must spend time on-site interacting with the people studied. Therefore, following the analysis of the lesson plans provided by teachers, those that indicated the use of ICT in their teaching and learning were visited in their classes to be observed how they use ICT and the type of ICT used. The report from spending the time at the schools collecting data from Grade 1 teachers included lessons learned and patterns found that connect with theoretical framework that guides the study.

3.5 Role of the researcher

The researcher's role is at the heart of the research; therefore, it is crucial for their role to be clarified (Unluer, 2012). The researcher's role is influenced by the paradigm or philosophical worldviews that guided the study such as the interpretative paradigm (Postholm & Madsen, 2006). Interpretative paradigms suggest that meanings are formed through social interactions with participants; hence, the researcher's role included creating rapport with Grade 1 teachers and spent time in the three schools collecting data. Although this is a case study and the researcher spent time in the field collecting data from participants, the researcher assumed the role of an outsider as he was not a teacher at any of the three selected former Model-C schools (McMillan & Schumacher, 2010). The Interpretative paradigm emphasises that researchers must rely as much as possible on the participants' views of the phenomenon being studied (Creswell, 2014). Guided by this worldview, the researcher was responsible for recruiting participants, designing the specific data collection instruments, conducting and recording interviews as well as observing Grade 1 teachers when using ICT to teach. According to Creswell (2014) an interpretivist researcher's intention is to interpret the meanings others have about the world. Therefore, the data collected from Grade 1 teachers was personally analysed by

the researcher. Furthermore, the researcher also ensured that data collection methods and analysis were not compromised, and ethical guidelines were adhered to (Cope, 2013; Maree, 2016).

3.6 Site selection

As Maree (2014) contends, it is important to select research sites that are suitable and feasible. Three former Model-C primary schools from Ngaka Modiri Molema District were purposefully selected as research sites for this study. The district is in the North-West province and consists of sub-districts such as Ratlou, Tswaing, Mafikeng, Ramotshere Moilwa and Ditsobotla. This district was chosen because schools used in this study were easily accessible as the researcher is a teacher from the same district. This district includes schools that are both previously disadvantaged and schools that are former Model-C. The schools in the district are classified into wealth quintiles 1 to 5 (Nqata, 2018:44). Quintile 1 to 3 schools are “no fee” paying schools that receive full subsidy from the state and are situated in rural and township areas. Quintile 4 and 5 schools are situated in affluent areas and are fee paying schools receiving less subsidy from the state (Mestry, 2013). Schools selected in this study were purposively sampled because they are former Model-C schools ranked between quintile 4 and 5. Since these schools are also fee-paying schools, they are deemed relevant to this study because they are resourceful and have ICT tools to be used by Grade 1 teachers. The selected schools are not the only former Model-C schools in the area; however, they were selected because they were close to the researcher’s home to cut traveling costs.

3.7 Participant selection

Purposeful sampling was used to select participants from this study. According to Leedy and Ormrod (2013), in purposive sampling, units or people must be chosen for a particular reason. Additionally, this sampling procedure is used to identify and select rich information cases (Creswell, 2016). The participants chosen in this study were Grade 1

teachers with 5 or more years of experience and came from three former Model-C schools in the Ngaka Modiri Molema District. Since all these teachers have 5 years or more experience teaching Grade 1, they are perceived to have been using ICT in their teaching and learning and are in a better position to provide information that can answer research questions from this study. Furthermore, by virtue of them teaching at former Model-C schools, they are in a better position to have ICT tools at their respective schools. As Leedy and Ormrod (2010) suggest, participants should have a direct experience with the phenomenon being studied. Concisely, all participants from this study were Grade 1 teachers who used ICT in their teaching and learning. Grade 1 is chosen because of its vulnerability – where the use of ICT should be more utilised to ensure that learners acquire ICT skills to be able to survive in the following grades.

3.8 Data collection

Data collection is defined by Creswell (2016) as a chain of connected activities that are meant for collecting good information to answer specific research questions. To answer the research question, “What are Grade 1 teachers’ knowledge and use of ICT in selected North-West former Model-C schools?”, this study utilised three methods: interviews, document analysis and participant observations. The use of numerous methods of data collection ensured credibility of the results (Maree, 2016). Before the first phase of data collection, consent forms were distributed to Grade 1 teachers to sign (give consent to participate in the research).

To establish a relationship with participants, the first phase of data collection included face-to-face, one on one semi-structured interviews with Grade 1 teachers. Immediately after the interviews were conducted and audio recorded by the researcher, lesson plans and ATPs were requested from the Grade 1 teachers to corroborate the information gathered from the interviews (Descombe, 2017). Furthermore, documents such as lesson plans indicated which teachers used ICT in their teaching and therefore the researcher was able to know who needed to be observed. The last phase included observations of Grade 1 teachers who indicated the use of ICT in their teaching. Class observations were done last due to their time-consuming nature; observations were able to validate what

Grade 1 teachers had mentioned in their interviews and confirm data from collected documents.

3.8.1 Interviews

Interviews were used in this study as the first method of data collection. An interview is a conversation between two or more people aimed at collecting information responding to predetermined research questions (Kumar, 2008; Creswell, 2014; Maree, 2016). Interviews are a good source of data collection in a qualitative study because they are a social conversation and allows the researcher to see the world of the participants through their eyes (Creswell & Guetterman, 2018). There are three forms of interviews identified by Ockleford and Windridge (2009); they are open-ended, structured, and semi-structured interviews. For this study, in-depth semi-structured interviews were used to generate information on Grade 1 teachers' knowledge and use of ICT. Semi-structured interviews are utilised to generate detailed information as they can delve into a topic and thoroughly give out an understanding of the answers provided (Harrel & Bradley, 2009). The researcher used open-ended questions that focused on Grade 1 teachers' knowledge and use of ICT in their teaching. The nature of open-ended questions allowed the researcher to delve deeper into the topic. In addition, through open-ended questions, the researcher was able to probe and stimulate teachers to divulge more about the issues under investigation (Maree, 2016).

An advantage of using semi-structured interviews is that they are flexible and may lead to plentiful information beyond what the researcher had planned. However, Opdenakker (2006) asserts that this may sometimes change the focus of the interview. To guard against this, the researcher used an interview schedule, attached as appendix A, to guide the interview. The researcher simplified the research questions as much as possible and they were checked by the research supervisor and the ethical clearance committee. Since the two sampled schools used English as the language medium, the interviews were conducted in English to enhance understanding. This allowed participants to express themselves freely regarding their knowledge and use of ICT in their teaching. The interviews were conducted one-on-one with Grade 1 teachers at three different former Model-C primary schools. Interviews spanned over a one-week schedule, with each

interview lasting for about 30-45 minutes after school hours in the absence of learners. The researcher's role was to ask questions during the interviews, record the interviews using (Denzin & Lincoln, 2018). The interview assisted with responding to the first and last research questions of this study. Which ICT tools do teachers in former Model-C schools use to teach in Grade 1? And what are teachers' knowledge on the use of ICT to teach Grade 1 in former-Model C schools?

3.8.2 Document analysis.

Document analysis was utilised as the second phase of data collection in this study. Creswell (2014) argues that documents allow the researcher to grasp the participants' words and language in their written form. This type of information is original without being influenced by the circumstances like the presence of the interviewer during the interviews. To obtain such information, the researcher requested lesson plans from three Grade 1 teachers immediately after the semi-structured interviews. These lesson plans provided the researcher with valuable information to answer the second research question in this study (Bowen, 2009). The analysis of collected lesson plans enabled the researcher to gain an understanding of how Grade 1 teachers in former Model-C schools used ICT in their teaching. Furthermore, the lesson plans captured the type of ICT tools used by Grade 1 teachers in their teaching. Document analysis assists with the identification of questions that need to be answered and situations that need to be observed in research (Bowen, 2009).

Teachers were also requested to provide the researcher with their Annual Teaching Plans (ATP). The ATP is a document laid out by the Department of Basic Education that guide what teachers will teach, what they will assess, and the resources used (Du Plessis & Morais, 2015). The analysis of these documents assisted the researcher with gaining an understanding of the type of ICT tools that should be used by Grade 1 teachers, and identifying the knowledge teachers have in terms of using such ICT tools during observations (Descombe, 2017). Finally, the researcher downloaded the Grade 1 CAPS document from the internet to analyse and provide information regarding Grade 1 teacher's use of ICT in their teaching.

3.8.3 Observation

The final phase of data collection in this study included observation. All three Grade 1 teachers from three sampled former Model-C schools were observed separately. The researcher followed Brancati's (2018) steps of observation. Firstly, the researcher identified the case for analysis by selecting to observe Grade 1 teachers whose lesson plans indicated the use of ICT to ensure that they give rich information needed for this study. The second step involved requiring permission to enter the schools and observe Grade 1 teachers. After the interviews, the researcher asked permission from teachers to observe them as they teach. The third stage was to build a good rapport with the participants for them to allow the researcher in their space (the classroom). The researcher achieved this by assuring participants that he would only record information needed for this study and not for any other use and would not disturb the teaching and learning process. The researcher then observed Grade 1 teachers with the aim of getting information on their knowledge and use of ICT. Lastly, the researcher recorded the observations by taking field notes and recorded what he saw regarding teachers' knowledge and use of ICT.

Brancati (2018) regards participant observation as a data collection method where the researcher gets significantly involved in the environment of their subjects over an extended period. The researcher was involved in the Grade 1 environment by observing teaching to gain an understanding of their knowledge and use of ICT. According to Bernard (2006), participant observation allows the researcher to see the behaviour they are interested in as it happens. Observing Grade 1 teachers shed some light on how they used ICT to teach.

Kawulich (2011) suggests that observation is a useful method of data collection as it provides the researcher with ways to check for non-verbal expressions like how Grade 1 teachers interacted with learners while using ICT. Observing Grade 1 teachers also enabled the researcher to establish the amount of time teachers spent using ICT. Furthermore, the use of participant observation is believed to increase the validity of the study as it assisted the researcher to have a better understanding of the context and phenomenon being studied. Participant observation assisted the researcher to see how

the classroom context influenced the way the Grade 1 teachers used the ICT tools, as Bernard (2006) suggests. Moreover, the process of observing Grade 1 teachers identified behaviours that were missed during the interviews due to the limitations of procedural memory and corroborated some of the key information from the interviews and document analysis to strengthen the findings.

A total of three observations were conducted with three different Grade 1 teachers from their different schools, as this study followed a multiple case study design. The first Grade 1 teacher was observed presenting an English home language lesson where she presented this lesson using a smartphone, Bluetooth speaker and YouTube video. This captured learners' attention because of the projected sound and moving pictures from the YouTube video. The second teacher presented a mathematics lesson teaching learners counting using a number line. A laptop was used to show learners a live digital number line. In the last observation, the teacher taught learners "my body" theme from a Life-Skills subject. The teacher used a Bluetooth speaker, smartphone and YouTube as ICT tools that got learners excited and interested. Observations were done during the school times according to the school timetable.

During this process, the researcher assumed the role of a non-participant observer (Creswell, 2014). This ensured that the researcher did not significantly change the behaviour of teachers and provided the researcher with a more natural and accurate and representation of the results (Brancati, 2018). Being a non-participant observer afforded the researcher enough time to capture and record all important events during the observations. The researcher recorded all the important events using field notes and modern digital photo/video and audio recorders. Using such multimedia assisted the researcher to recall important events because more than one sense is utilised, as suggested by the Cognitive Theory of Multimedia Learning (CTML) that underpins this study (Meyer, 1997).

3.9 Data analysis

The data collected from interviews, document analysis and observation were merged and analysed logically. Creswell (2016) states that data analysis includes organising collected data, coding and organising it into themes, data presentation and forming an interpretation of them. In this study, thematic analysis was used to analyse data. According to Braun and Clarke (2012:02), “thematic analysis is a method for systematically identifying, organising, and offering insight into, patterns of meaning (themes) across a dataset.” This method of analysis was preferred for its accessibility and flexibility.

3.9.1 Interviews data analysis

Siedman (2013) suggests that when working with data from participants, the researcher needs to transform what was said verbally into a written text to be studied. Furthermore, Merriam (2008) suggests that the data analysis process begins with open coding. This process begins when the researcher starts reading the interview transcripts. The researcher listened to the recorded audio tapes repeatedly while transcribing them. Transcribing the data assisted the researcher to immerse himself in the data and know more about it (Seidman, 2023). The next stage was to go back to the codes and comments that were made during open coding and then establish connections. As Creswell (2013) suggests, the next step is the axial coding which entailed reading over the codes and the underlying data to find how they can be grouped into categories.

According to Leedy and Ormrod (2014), the next step after axial coding is selective coding. Selective coding involved combining the categories and their interrelationships to create a storyline that described what happens in the phenomenon under study. This final stage of coding led to the creation of themes that answered research questions from this study.

3.9.2 Document analysis

According to Fisher (2006), qualitative document analysis requires data to be examined and interpreted to produce meaning, gain an understanding, and produce empirical

knowledge. Documents that were analysed were lesson plans, ATPs, and the CAPS document. The researcher used thematic analysis to analyse data from these documents. Pre-defined codes from the interviews were used as the document analysis is an auxiliary method used. The codes used in interview transcripts were applied to the content of documents. Through the assistance of these pre-defined codes, relevant information was extracted from these documents, and was coded. Codes and the themes that were produced served the purpose of integrating data gathered from the interview. Finally, the data from documents verified some information from the interviews (McMillan & Schumacher, 2010).

3.9.3 Observation analysis

Observation involves “a prolonged immersion to gain first-hand knowledge of the context, primarily through observation of individuals as they go about their normal work activities” (Gillham, 2000:53). The researcher observed Grade 1 teachers in their classes as they integrated ICT into their teaching. As a non-participant observer, the researcher used an observation guide (Appendix H) to get information on what type of ICT tools were used and how they were used. Like interviews and document analysis, thematic analysis was used to analyse information collected from observations. The researcher recorded what was happening in class in the observation guide. Next, the researcher assigned codes to the information from the guide and later turned them into categories. This process led to the creation of themes that are related to the research questions.

When analysing the data, the researcher followed the six stages suggested by Braun and Clarke (2006). The first phase included familiarisation with the data. In this stage, the researcher immersed himself in the data by reading and re-reading transcripts from the interviews conducted with Grade 1 teachers, that is reading the data collected from lesson plans, ATPs, CAPS, reading the field notes as well as watching the video data collected from the class observation.

The second phase involved coding. Chazman (2006) argues that coding is an important link between collecting data and developing an emergent theory of this data. Through coding the researcher can understand what is happening in the data and derive meaning from it. The researcher read every data item and coded items that were relating to the

research questions. The researcher coded the entire data item by drawing a coding frame and used pre-set coding.

In the third phase, the researcher searched for themes. A theme is described as a logical and meaningful pattern in the data relevant to the research question (Braun & Clarke, 2006). This stage involved reviewing the coded data to identify areas of similarity and overlap between codes. The codes that shared some underlying features were collapsed and clustered together so that they reflected and described a coherent and meaningful pattern in the collected data. The themes were formulated based on this study's research questions and aims.

The fourth phase included reviewing the themes in relation to the coded data and the whole data set. The researcher checked the themes against the collated data extracts and checked whether the themes worked in relation to the data. The essence of this process was about quality assurance and checking whether the themes were telling a convincing story. At this phase, the researcher named and defined themes after a detailed analysis of data. This enabled him to get the true nature of each theme and creating a concise, powerful and informative name for each theme. Following the guidelines from this phase, all themes were named.

This last phase involved constructing the analytic narrative and cosmic data extracts for the purpose of reporting to the reader a story that is both coherent and convincing as well as contextualising it to the existing literature and theoretical framework in the existing chapter 2. Through thematic analysis, the researcher was able to explore Grade 1 teachers' knowledge and use of ICT in selected North- West former Model-C schools.

3.10 Trustworthiness

Trustworthiness is essential in qualitative research as it aids in the researcher's data analysis, findings and conclusions (Maree, 2014). Moreover, trustworthiness in qualitative study is regarded as the level of confidence in the collected data, interpretation and the methods used to ensure the study's quality (Connely, 2016). To ensure trustworthiness

of this study, the researcher used triangulation, external auditor, and prolonged time in the field and member checking as suggested by Creswell (2014).

3.10.1 Triangulation

Triangulation is achieved through the utilisation of various data collection methods to formulate coherent themes and bring about consistency in the findings (Creswell, 2014; Houghton et al., 2013). If themes are formed based on different data sources, this adds to the validity of the study. Triangulation was achieved in this study by using three data collection methods. The researcher used semi-structured interviews to interview Grade 1 teachers to gain information on their knowledge and use of ICT. Their lesson plans were collected to corroborate and add on the information gained from interviews. The last data collection method included observation when the Grade 1 teachers were observed on how they used ICT in their teaching. All the data from three methods were compiled to check if all reached the same conclusions.

3.10.2 External auditor

Creswell (2016) asserts that external auditing assesses the trustworthiness of the study. They further claim that the external audit highlights the dependability of the study from a methodological point of view, the confirmability of the study by reviewing the data, analysis and interpretations, and assessing whether the findings represent the data or not. For this study, the researcher asked reputable lecturers in the Education faculty to serve as external auditors. A lecturer who was requested had qualitative methodological expertise, experienced within the field of ICT in education and had no connection or affiliation to this study. The following materials were submitted to external auditors to enhance trustworthiness of the study: raw data, coded transcripts, chapters of the dissertation, field notes and data collection instruments. Once the auditing process was completed, the auditor signed the audit attestation and submitted it to the researcher, together with all the material to bring closure to the audit.

3.10.3 Prolonged time in the field

This technique involves the researcher immersing himself in the site long enough to build trust and rapport with the participants and for him to experience the breadth of variations and overcome distortions due to his presence (Williams & Kimmons, 2022). Since this study followed a multiple case study design, the researcher was able to spend more time at schools interviewing and observing Grade 1 teachers. As a result, the researcher was able to have an in-depth understanding of Grade 1 teachers' knowledge and use of ICT. As Creswell (2014) suggests, the long interaction with participants helped with the acquisition of accurate information leading to enhancing the validity of the study.

3.10.4 Member checking

According to Creswell (2014), member checking involves consulting participants regarding the findings of the study; this process serves to authenticate the accuracy of the results. All participants were given transcripts of the interview as well as the researcher's summary. Participants were given opportunities to make corrections on the interview transcripts (Williams & Kimmons, 2022). Furthermore, themes and categories were shared with participants for them to ensure that they reflected their responses.

3.11 Ethical Considerations

Ethical consideration was an important part of this study as it is meant to protect the participants of this study (Hammett et al., 2015; Maree, 2016). Before research can be conducted, it is important to seek a letter of approval from the institutional review board (Creswell, 2018). This researcher obtained ethical clearance letter from the ethics committee of the Faculty of Education at the University of the Free State (Appendix C). The next step was to send a letter to the North-West Department of Basic Education to grant permission to conduct research at selected former Model-C schools, and permission was granted. Participants received letters inviting them to participate in the study and the letter clearly stated that participation was voluntary and that they could withdraw from the study at any point if they felt uncomfortable. Before the first phase of

data collection (interviews), participants that were willing to partake in the study signed consent forms attached (Appendix E), with all the details about the study as endorsed by Rossman and Rallis (2016).

According to Rossman and Rallis (2016), researchers must maintain confidentiality in order to protect the privacy of participants and hold in confidence what participants share with them. To uphold privacy and confidentiality in this study, the participants' names were not mentioned, and they were given codes. Furthermore, the schools' names were also not mentioned as they were labelled School A, B and C. Finally, the participants involved in this study had the right to be protected from harm and any form of discomfort; therefore, the researcher ensured that the data collection methods used did not put participant's life at risk (Botman et al., 2020).

3.12 Chapter summary

This chapter addressed the research design and methodology of this study. The study adopted the qualitative research approach to explore Grade 1 teachers' knowledge and use of ICT. A case study research design was utilised to gain an in-depth understanding of the phenomenon under study. Sampling procedure and methods of data collection were clarified. The chapter further highlighted the role of the researcher and the ethical guidelines followed. The following chapter deals with data presentation, interpretation and discussion.

CHAPTER 4: PRESENTATION OF FINDINGS

4.1 Introduction

The previous chapter discussed and presented the study's research design, including specifying the methods of data collection and analysis. This chapter presents and discusses data that was obtained through interviews, observation, and document analysis. Thematic analysis was used to analyse data, after which three themes emerged.

4.2 Demographic information of participants

Presentation of data starts with summarising participants' demographic backgrounds. The three participating schools under this study are former Model-C, Quintile four schools. These are fee-paying schools situated in affluent areas where most parents are working. Table 4.1 below shows participants' demographic information with five demographic values such as gender, qualifications, teaching experience and Grade 1 experience.

Table 4.1: Demographic information of research participants

Participant	Gender	Age	Qualifications	Teaching experience	Grade 1 experience
P1	Female	42	Bachelor of Education in Foundation Phase	6 Years	5 Years
P2	Female	40	Bachelor of Education in Foundation Phase	8 Years	7 Years
P3	Female	29	Bachelor of Education in Foundation Phase	6 years	6 Years

According to Table 4.1, all three participants are females with the relevant qualifications to teach in Grade 1 as they all have Bachelor of Education (Bed) in Foundation Phase. Their teaching experience ranges between six to eight years. This means that they recently graduated from institutions of Higher Education when ICT was mostly used. Therefore, it is likely that they are comfortable with using ICT in their teaching.

4.3 Emerging themes

Table 4.2: Summary of emerging themes and categories as related to secondary research questions

Research questions	Themes	Categories
Which ICT tools do teachers in former Model-C schools use to teach in Grade 1?	ICT tools used by Grade 1 teachers in former Model-C schools.	Teacher owned
How do teachers in former Model-C schools use ICT to teach in Grade 1?	Grade 1 teachers use of ICT in former Model-C schools	Learner engagement
What are Grade 1 teachers' knowledge on the use of ICT to teach Grade 1 in former Model-C schools?	Grade 1 teachers' knowledge on the use of ICT	Self-taught knowledge ICT training ICT policy knowledge

After analysis, three themes emerged from three research questions as illustrated in Table 4.2. These themes emerged from data that was collected from semi-structured interviews, document analysis and observations. There was a significant interrelationship between data collected from interviews from Grade 1 teachers, document analysis and class observations. Themes and categories will be discussed in detail in the following sections.

4.4 ICT tools used by Grade 1 teachers in former Model-C schools

This first theme ICT tools used by Grade 1 teachers in former Model-C schools relates to the study's first research question. The has been categorised into one 'teacher owned ICT tools' Lesson plans, class observations and interview transcripts were analysed carefully to extract data for this theme.

4.4.1 Teacher owned ICT tools

All three teachers used similar ICT tools and most of them were teacher owned and not provided by the school. The following table shows the type of ICT tools used by the three teachers.

Table 4.3: ICT tools used by teachers in participating former Model-C schools

Type of ICT tool used	Participant 1	Participant 2	Participant 3
Smartphone	X	X	X
Bluetooth speaker	X	X	X
Laptop		X	
Internet	X	X	X
YouTube	X		X
Overhead projector		X	

Table 4.3 highlights the type of ICT tools used by teachers in this study. According to the information, all three teachers used the similar tools that were owned by them. The only ICT tool that belonged to the schools was the overhead projector used by participant 2.

Participant 1 had this to say when she was asked about the type of ICT tools they have at her school:

P1 *"No we don't have any ICT tools provided by the school, but we use our own such as cell phones and Bluetooth speaker".*

Even though Participant 1 is from a former Model-C school like the other two participants from this study, results indicate the ICT tools she is using are not provided by the school, but through her own means. For instance, she mentions that she is using YouTube videos from her own smartphone.

P2 *“Ya at this point we don’t have Wi-Fi, let’s start there, the Wi-Fi is only in the office, so the classrooms doesn’t have Wi-Fi, so we must make use of our own, like now I had to make use of my cellphone.”*

Furthermore, participant 2 alluded that *“We basically just use the projector, I connect it to my laptop with music like the sound, that’s how I used it.”*

Just like participant 1, most of the ICT tools that participant 1 is using for her teaching and learning are her own tools as the school only provides little. When asked about the type of ICT tools she is using, participant shared:

P3 *“Like for now, I use my phone and connect it to the speaker, that you saw. I use it for example Life-skills and English. For example, like we did the theme “my body” there is a song that the learners would sing for you, so it makes it exciting for them to understand the theme.”*

It is interesting to note that all three participants integrated ICT into their teaching and learning. This is in line with Willmann (2017) who emphasised the importance of ICT usage in Early Childhood Education. Participants 1 and 3 used YouTube in their classrooms to allow learners to hear and see stories during listening and speaking to enhance their understanding. Participant 1’s learners watched a story on YouTube, while participant 3’s learners watched a “my body” video. According to the Cognitive Theory of Multimedia Learning that underpins this study, it stresses that learners learn best from words and pictures than with words alone (Meyer, 2009). By using YouTube as an ICT tool, teachers acknowledged that it would enhance their learners understanding of the concept taught. Participant 1 shared the following about the use of YouTube:

P1 *“I usually go to YouTube and just search, but the ones I like is Nal’ibali (here’s the story) because they even use sounds for when its different animals which is interesting to the learners because as they listen, they also picture instead of the conventional way of using the storybook.”*

The use of a portable Bluetooth speaker was popular amongst all three participants of this study. All three teachers indicated that they use their own Bluetooth speakers to produce sounds for their learners during listening and speaking and Physical Education (PE) activities for music. The use of portable Bluetooth speakers in teaching and learning is seen as a strategy to improvise for the lack of ICT tools in schools because all these Bluetooth speakers belong to the teachers and not the school. Participants reported that the school management team (SMT) does not support teachers or allow them to easily use available ICT tools.

All three teachers successfully used smartphones in their teaching and learning. According to Mukhari (2016), teachers must be able to integrate smartphones in their lessons. Teachers were able to do this by using their smartphones to search for content on YouTube and connecting their smartphones to their Bluetooth speakers to produce sound for the learners. Furthermore, ICT tools such as computers and software may be used to make literacy teaching effective and fun for learners in the Foundation Phase (Avodele et al., 2020). Participant 2 and 3 indicated that they were using laptops in their classrooms. Participant 2 went further by stating that she shows learners live worksheets from the screen to ensure that they see the movement which was considered exciting.

Findings from the interviews indicate that teachers used their urgency when using ICT in their lessons as the type of ICT tools used were teacher owned and not school owned. Participant 1 indicated that:

“We do have, we do have, ummm but we don’t have access to it. We have got iPads, we have got laptops, we have got a projector, yah.” P1

These results resonate with Dube et al. (2018) who uncovered that some South African primary school teachers criticised the rules that were imposed on them by the School Management Team (SMT) regarding which teachers were entitled to use ICT and for which specific subjects. These results highlight that although the school may be resourced with ICT tools, teachers use of these tools depends on the SMT. One of the strategic objectives of the e-Education policy is that “every teacher and learner in General and Further Education and Training must have access to ICT infrastructure (DoE, 2004:29), but this is not the case in the participating schools under this study.

Document analysis was utilised as the second phase of data collection in this study. Creswell (2014) argues that documents allow the researcher to grasp the participants' words and language in their written form. This type of information is original without being influenced by the circumstances like the presence of the interviewer during the interviews. To obtain such information, the researcher requested lesson plans and ATPs from three Grade 1 teachers immediately after the semi-structured interviews.

Table 4.4: Data extracted from CAPS English HL Foundation Phase

Document	The document's information about ICT in teaching and learning	Teachers' implications	Learners' implication
Curriculum and Assessment Policy Statement (CAPS)	<p>The National Curriculum Statement Grades R-12 aims to produce learners that can:</p> <p><i>use science and technology effectively and critically showing responsibility towards the environment and the health of others.</i></p>	<p>Recommended tests/resources for the year:</p> <p><i>Musical instruments (tambourine, percussion sets etc.)</i></p> <ul style="list-style-type: none"> • <i>CDs or tapes with stories (read or told), poems, rhymes and songs, CD player or tape recorder, television, and video tapes/ DVDs</i> • <i>Storybooks and oral stories</i> • <i>Poems, songs and rhymes</i> 	<p><i>Talks about personal experiences, for example, tells news expressing feelings and opinions.</i></p> <ul style="list-style-type: none"> • <i>Listens without interrupting, showing respect for the speaker and taking turns to speak</i> • <i>Uses appropriate language when speaking to friends and adults, recognising the way the class uses slang. For example, telling parents how the ball came to break the window and then telling friends about the same incident</i>

Source: DBE (2011: 105)

Table 4.4 shows data extracted from CAPS English HL Foundation Phase. CAPS aims to produce learners who use science and technology effectively and critically, showing responsibility towards the environment and the health of others. Column 3 of the table shows teachers' implications of the CAPS statement where teachers should use resources or ICT tools such as CDs, tape recorders, television and video tapes or DVDs





for their listening and speaking lesson. The last column indicates the learners' implications. The researcher thoroughly analysed this policy to answer the study's research question. The policy provided information regarding the type of ICT tools that may be used by teachers listed in column two of the table 4.4. However, the ICT tools were merely listed under as CAPS does not give teachers knowledge on how they can use these tools in the teaching and learning process.

4.4.1.1 Annual Teaching Plans (ATP)

The ATP is a document laid out by the Department of Basic Education that guides what teachers will teach, what they will assess, and the resources that should be used (Du Plessis & Morais, 2015). ATPs were collected from all three participants to gain information on which ICT tools to be used in Grade 1. Although all three schools fall under the same Ngaka Modiri Molema District, their ATPs were all different. Unfortunately, all three ATPs collected did not provide teachers with any information about the type of ICT tools they can use or how they can use them. Resources that are listed include flash cards, DBE Workbooks, posters, cubes, and number line. The findings suggest that official documents such as the ATP does not provide teachers with any knowledge regarding the use of ICT in teaching and learning.

4.4.1.2 Lesson plan analysis

Lesson plans were collected from teachers immediately after the interviews, to be analysed. This type of document was used to corroborate data from the interviews and for additional information that the participant may have forgotten to mention during the interview (Descombe, 2017). From all three participants, only participant 3's lesson plan included ICT as a resource. Participant 3's lesson plan included PowerPoint as a tool that is used in class. However, Participant 3 did not mention the use of PowerPoint during the interview. All three participants' lesson plans are shown in the figures below.

TERM 2 - WEEK 1		HOME LANGUAGE: GRADE 1			EDUCATOR:		
		MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
LISTENING & SPEAKING	DAILY: Day, date, weather, special days, register, news, diary, events, stories.	Listens without interrupting, taking turns to speak in whole class. Talks about personal experiences e.g. tells personal news.	Listens to instructions and responds appropriately. Passes on messages. Participates in classroom discussions.	Listens to stories and identifies the main idea. Sequences pictures of a story. Asks questions related to stories told and read.	Listens to stories with interest, drawing a picture to show understanding. Answers closed and open-ended questions.	Joins in the choruses of songs, stories, rhymes. Says poems and rhymes and does the actions. Identifies part from the whole such as parts of a bicycle, plant.	
	WORD & SENTENCE CONSTRUCTIONS	Review single letter sounds at beginning of words s a t	Review single letter sounds at beginning of words i p n	Review single letter sounds at beginning of words c k e	Review single letter sounds at beginning of words h r m	Review single letter sounds at beginning of words d g o	
PHONICS	PHONICS	Review single letter sounds at beginning of words s a t	Review single letter sounds at beginning of words i p n	Review single letter sounds at beginning of words c k e	Review single letter sounds at beginning of words h r m	Review single letter sounds at beginning of words d g o	
	SIGHT WORDS	Sight Words: I, O, a, and, is, not, the, had, from, me, that, an					
READING	SHARED & GUIDED READING	Understands and uses appropriate language/vocabulary of different subjects. Describes objects in terms of age, direction, sequence using correct vocabulary.	Uses pictures to predict what the story is about. Interprets pictures to make up own story. Uses clues and pictures in the text for understanding.	Discusses the story, identifying the main idea in the text, the main characters etc. Discusses the use of capital letters and full stops. Begins to monitor self when reading, both in the area of word recognition and comprehension.	Reads aloud from own book in a guided reading group with teacher, that is, the whole group reads the same story.	Answers a wide variety of types of questions based on the texts read including higher order type questions.	
	INDEPENDENT READING	Build a sight vocabulary from the incidental reading programme, reading series and high-frequency.	Uses phonics, context clues and sight words when reading.		Rereads familiar texts such as those read in Shared Reading sessions	Reads to a partner from prepared or known texts to develop fluency.	
WRITING	HANDWRITING	a A  Annie Apple says a, a, a	Writes and copies short, simple sentences from chalkboard.	b B  Bouncing Bens says b, b, b	c C  Clever Cat says c,c,c	d D  Dippy duck says d,d,d	
	SHARED & GUIDED WRITING	Writes sentences using words containing the phonic sounds taught.	Writes one/two sentence of own news or shared writing.	Completes a list of words according to instructions such as food or transport.	Draws pictures to convey a message, adding a label or caption, e.g. about a personal experience.	Contributes ideas for a class story. Begins to build own word bank and personal dictionary.	

Sources: Writing books - *Fair and Margie*, reading books / big books; different writing materials; workbook

Enrichment & Interventions: Reading Corner; games from reading series

Assessment activities: Informal Assessment (observation) & Formal Assessment

Figure 4.1: Lesson Plan 1 from Participant 1



WEEKLY LESSON PLAN – MATHEMATICS

TERM: 2

WEEK: 6

GRADE: 1

DATE: _____

COMPONENTS	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Mental maths - Count objects 10 minutes	Count everyday objects to at least 20				
Mental maths - Count forwards and backwards 10 minutes	Counting forward in 2's and 5's 1 - 50				
Mental maths - Describe, compare and order numbers	- according to just as many, the same as from smallest to greatest and greatest to smallest - before, after, in the middle / between - introduce number lines to learners. (adding using a number line)				
Read and write numbers in symbols and words 15 minutes	Write number symbols up to 20	Read number names up to 10	Write number names up to 9	Identify and read number symbols and names up to 20	
Solve problem in context	- Solve addition and subtraction problems to 10 - Solve number and word problems in context - Grouping and sharing of numbers				
Addition and subtraction	- Solve addition and subtraction problems up to 10 - Bonds up to 7				
Money	- Introduce the concept of money. - Show learners different forms - coins and notes. - Addition of money				
Geometric patterns Algebraic patterns	Algebra Patterns and functions - Copy and extend patterns using shapes and objects. - Complete number patterns. 1 - 20 Act. 58: Five pattern to 20 pp. 122-123 Act. 59: Ten patterns of 10 pp. 124-125				
Length	Measurement - Comparing length - talk about long short Act. 12a: Length and Position pp.25-26				
ASSESSMENT	Informal				
Resources	White boards and markers, counting blocks, counting sticks, number lines. DBE BOOK				

Figure 4.2: Lesson Plan 1 from Participant 2

Life Skills Lesson Plans – Term 2 2023

Teacher - _____

Grade 1		Date: 8 – 12 May 2023		Term 1: My Body		Week 5	
Time	Subject	Monday	Tuesday	Wednesday	Thursday	Friday	
30min(x4)	Personal and social well-being	PowerPoint My body DBE, p. 48, 49	How does your body work	How does my body differ from my friends?	Name the different body parts	How must I treat my body?	
30min(x2)	Creative arts: Performing arts		GoNoodle: How can my body move?		Show your friends what is unique about your body? E.g. Dark eyes, curly hair, length, short etc.		
30min(x2)	Visual arts	Colour the different body parts		Stick your skeleton on a picture with ear sticks.			
30min(x2)	Physical Education		Lesson 5: Balance • Walk on a rope or line marked on the ground • Balance on a low balancing beam / plank • Balance on chairs		Lesson 5: Balance • Walk on a rope or line marked on the ground • Balance on a low balancing beam / plank • Balance on chairs		

Figure 4.3: Lesson Plan 1 from participant 3

Table 4.5: Lesson analysis table

Participant Lesson plan	Subject	Lesson topic	Type of ICT tools used for teaching and learning	How are ICT tools used for teaching and learning
1	English HL	Reading	No ICT tools mentioned in the lesson plan	No ICT tools
2	Mathematics	Counting	No ICT tools were mentioned in the lesson plan	No ICT tools
3	Life-Skills	My body	PowerPoint	No clear indication

Table 4.5 captures evidence from all three participants' lesson plans with regards to the use of ICT into their teaching and learning. Venketsamy and Hu (20) maintain that successful use of ICT in the classroom requires thoughtful integration of technology and pedagogical processes during lesson preparations. However, Zenda and Dlamini (2022) study findings indicated that teachers lack knowledge and skills to use ICT for lesson planning and integration. The results from this study are aligned with Zenda and Dlamini (2022) because according to the lesson plan presented, only one lesson plan from Participant 2 reflected the integration of PowerPoint as the ICT tool used. However, even though there is an indication of ICT integration, the lesson plan does not indicate how it will be used. Participant 1 and Participant 2's lesson plans did not highlight any integration of ICT tools. It is also interesting to note that Participant 1's lesson plan was done for her from the DBE, which might have been the reason why the teacher could not plan to use ICT in her lesson. If teachers do not plan for their lessons, it means they make impromptu decisions even when integrating ICT.

4.4.1.3 Data from class observations

The purpose of lesson observation was to find out which ICT tools Grade 1 teachers in former Model-C schools use to teach. The observation further assisted the researcher to assess how Grade 1 teachers use these ICT tools in their teaching and learning. Lesson observation assisted the researcher to corroborate data from interviews and document

analysis. The lesson observation tool below was used to record the events that took place in class as Grade 1 teachers were using ICT to teach.

Table 4.6: Lesson observation tool

Date and time	Participant	Situation analysis	Type of ICT used, and its usage	Reflection
10/05/23	Participant 1	English HL (Listening and speaking lesson)	Bluetooth speaker connected to a smartphone was used to tell a story.	Learners listened attentively because the speaker projected more volume and learners could hear the story clearly. Learners were able to retell the story as assessment.
11/05/23	Participant 2	Teaching counting using a number line in a Mathematics subject.	The teacher used a laptop to show learners a live number line from her laptop.	The laptop screen was too small for all learners to see and be engaged. The teacher walked around showing learners what is on the laptop. The Overhead Projector was there but not functional.
12/05/23	Participant 3	Teaching the topic “My body” in the Life Skills subject.	The teacher used a smartphone connected to a Bluetooth speaker and searched for songs on YouTube.	The use of a Bluetooth speaker with videos from YouTube excited the learners. These ICT tools got learners jumping up and down and participated in the lesson.

The observation tool used in Table 4.6 aimed at providing information regarding the type of ICT used and how they are used. Participant 1 was observed during an English HL

listening and speaking lesson. Although her ATP and lesson did not mention using ICT as resources, she used a portable Bluetooth speaker connected to her smartphone. The teacher searched for a story on 'Nal'ibali' reading program using her smartphone (connected with Bluetooth) and played it for her learners. From the researcher's observation, learners paid more attention and participated more because the speaker produced better sound.

Participant 2 was observed presenting a lesson on a number line. Just like Participant 1, both her ATP and lesson plan did not include ICT as a resource to be used in her lessons. For this lesson, the teacher used a laptop for class of 40 students. Although the class had an overhead projector, this tool was not working and could not be integrated in the lesson. This is in keeping with the findings of Munje and Jita (2020) as they uncovered that broken ICT infrastructure inhibits the integration of ICT in teaching and learning. During document analysis, Participant 3's lesson plan indicated that PowerPoint presentation will be used as an ICT tool. However, this was not the case. She presented a Life Skills lesson using her own smartphone connected to a Bluetooth speaker. Learners listened to a "my body" song theme from YouTube. The following theme discusses how these types of ICT tools were used by Grade 1 teachers in former Model-C schools.

4.5 Grade 1 teacher's use of ICT in former Model-C schools

The theme relates to the second research question: How do teachers in former Model-C schools use ICT to teach in Grade 1? As Hennessy et al. (2015) point out, teachers are significant role players in the implementation of technology in the 21st century classroom. Therefore, the purpose was to assess how teachers use ICT in teaching and learning. Grade 1 teachers were interviewed and observed to gain information on their use of ICT. The results indicate that teachers are using ICT in classrooms for learner engagement.

4.5.1 Learner engagement

ICT tools can be used in various ways in the classroom (Kumar & Pasricha, 2014). Participants from this study used similar ICT tools for similar purposes. During an

interview, all three participants indicated the use of ICT in their classrooms. The following quotes show the teachers' views:

P1 said that *"it is mainly my cell phone, Bluetooth speaker for English and life skills because sometimes we need to do exercises, so I put in a sound for them and for English I use it for stories-listening and speaking."*

P1 further added that *"Its fresh, its new it's interesting. Its also easily accessible sometimes the kids get to learn something new. They get excited hearing sounds from the speaker like when they are busy with PE and they hear the music, it arouses their interest and can participate more."*

Similarly, **P2** indicated that *"Umm I have an app on my sound about animal sound, I would connect the phone to the speaker for them to hear the sound. When it comes to the laptop now like I said the overhead projector that's when you engage all the learners at once, maybe I want to show them how they shear a sheep, I would show them that's how it is done that's where clothes come from."*

P3 *"What I know is that it helps learners to understand the concepts more, it makes it exciting for them to get the content. Because they get to see, or they get to hear."*

According to the participants' responses when asked how they use ICT tools in class, it appears that they use them for learner engagement. Participant 1 used a Bluetooth speaker for an English lesson during listening and speaking for learners to listen and then answer questions later. This resonates with what Wahyudin et al. (2021) highlighted that ICT can enhance learners' literacy in four areas such as speaking, Listening, reading, and writing. According to Participant 2, using an ICT tool like an overhead projector assists her with engaging all learners at once because all of them would be able to look at the information of the big screen. It is also notable that Participant 3 has the knowledge that ICT helps learners with better understanding of the content because they get to see and hear. This means that this teacher is knowledgeable enough to select ICT tools that will enable learners to see and hear like the CTML emphasises (Meyer, 2009). This information reveal that teachers used ICT only for presenting some of their lessons and nothing was said about using ICT to plan for lessons. This might be caused by the fact

that teachers lack the knowledge of using ICT to effectively plan for lessons (Dlamini & Zenda, 2022). This implies that teachers need to be fully supported to be able to use ICT even for planning their lessons. More ICT support is also required from the SMT for teachers to be able to master this.

4.5.2 Data from observations

The researcher collected data to assess how Grade 1 teachers in former Model-C schools use ICT to teach. The purpose of the observation was to enhance the empirical information collected to gain an in-depth knowledge of the use of ICT by Grade 1 teachers.

All three schools observed are quintile 4 fee paying schools with the capacity to buy educational resources such as ICT tools (Mestry, 2014). However, the data from the non-participant observation by the researcher showed that most of the classrooms lacked the ICT resources to be used by teachers. This meant that teachers had to improvise and use their own resources to ensure that there was some extent of ICT integration in teaching and learning. For instance, Participant 1's classroom had no ICT resources. The teacher presented her English HL listening and speaking language using only a Bluetooth speaker and smartphone that she confirmed were her own, during the interview. The teacher searched for an audio story and used the 'Nal'ibali' programme using the smartphone, and then connected the smartphone to the Bluetooth speaker to ensure that all learners were able to hear the audio. The sound from the speaker captured the interest of some learners during the lesson which was observable by the response from the learners when the teacher asked questions. According to DoE (2004:19), "every South African learner in the general and further education and training bands will be ICT capable (that is, use ICT confidently and creatively to help develop the skills and knowledge they need to achieve personal goals and to be full participants in the global community) by 2013." It is saddening that we are now in the year 2024 and the ICT tools used by this teacher did not allow for learners to manipulate them or support the learner-centred approach.

The classroom from Participant 2's school had a wall-mounted overhead projector. Unfortunately, this ICT tool was not functional during the observation, as indicated by the

teacher. Participant 2 presented a Mathematics lesson and utilised a laptop as an ICT tool. Das (2019) conducted a study and uncovered that the use of ICT tool such as computers in Mathematics classrooms encouraged learners to work collaboratively and solved problems. The teacher stood at the front showing learners a live worksheet of a number line using her laptop connected to the internet. Although some learners were excited to see the screen, those seated at the back could not engage as the laptop screen was too small for them to see.

Participant three delivered a Life Skills lesson on “my body” theme. Just like the other two participants, her classroom lacked ICT resources. During the interview, the participant indicated that the school had ICT tools, but they had no access to them. The teacher searched for “my body” song on YouTube using her smartphone connected to the internet and connected with the Bluetooth speaker. From the researcher’s observations, the teacher managed to capture learners’ attention and engaged them in the lesson. Listening to the song produced by the speaker, learners formed a circle and performed the song using some actions. The successful use of ICT by teachers in their teaching and learning process also depends heavily on the type of knowledge they have. This will be discussed in the next theme: Grade 1 teachers’ knowledge on the use of ICT.

4.6 Grade 1 teachers’ knowledge on the use of ICT

This theme is linked with the study’s last research question “What are teachers’ knowledge on the use of ICT to teach Grade 1 in former-Model C schools?” Data was collected using interviews and observation to gather information on this question. The results reveal that participants have self-taught knowledge about the use of ICT.

4.6.1 Self-taught knowledge

Participants were asked what knowledge they have with regards the use of ICT on teaching and learning and the responses indicated that they had no scientific knowledge or training, but rather self-taught knowledge.

P1 *"It has to with the use of tech as in cell phone, laptops, and computers."* She further revealed that *"Well, the knowledge that I have is that I love YouTube I love being on the internet, so I use that knowledge that I must put it into my teaching, so it's not something that I have been trained or good at. It's something that I am always trying to tap into, to make things interesting for the children. It's something that I think its beneficial for the future."*

Similarly, participant 2 also never received any training for the use of ICT in classroom. This is what she had to say:

P2 *"The Knowledge, I have, it's like self-motivated it's something that came. As a teacher you learn every day, and you try to incorporate things to interest the learners. Because if we going to lose interest, then learns will do too. So, I think it's something I taught myself. I never went for typing lessons, so I taught myself."*

Participant 3 gave a very interesting response when asked about the knowledge she has: *"What I know is that it helps learners to understand the concepts more, it makes it exciting for them to get the content. Because they get to see, or they get to hear,"* This suggests that she understands the possibilities that ICT can bring to the classroom.

All three participants indicated that they were not trained for the use of ICT in teaching and learning, indicating that the ICT knowledge they have is self-taught. This is in line with the findings of Mpiti and Makena (2020) who report that this lack of technological knowledge is one of the common reasons why teachers are not integrating ICT into teaching and learning.

Despite the lack of ICT knowledge, participants report that they are willing to integrate ICT into teaching learning because they have the knowledge that ICT can improve students results, even learners with barriers. Participant 2 mentioned:

"I feel that it can benefit them, maybe they are visual learners and not learners that learn through print. Because I have two or three learners in my class they lose concentration quickly, so maybe the visuals can help them. When they see things in colour because we are all different, I think learners they learn different also. The benefits I would say, for learners that are fine, it would benefit them more, but I feel like for learners that are

behind, who have barriers, it can also benefit them. I think the sound, the visualisation, seeing things.” P2.

“... I think even children who are struggling, I think the use of ICT can help them, because sometimes you would find that the child is struggling in class but give them a cell phone and they will show you miracles. So, I think that also, can help them P1.” This implies that participants have the knowledge that the use of ICT tools that support dual channel (audio and visual) will enhance learners’ understanding like the Cognitive Theory of Multimedia, that underpins this study, suggests (Meyer, 1997). These findings are consistent with those of Venkatesamy and Hu (2022) where participants from their study highlighted that they do not mind using technology in teaching their foundation phase classroom, but they need to be capacitated with the appropriate knowledge and skills to do be able to do so.

4.6.2 ICT Training

Teachers must have the knowledge and understanding of including ICT into their teaching and learning process (Powers & Blubaugh, 2016). For this to happen, teachers must be capacitated through ICT training. All three participants had something to say about ICT training.

P1 *“We touched on it a little bit when I was in varsity, but that’s it you get to hear a little bit about it, but when you get to school you don’t have those tools to really get into ICT, so the training was not extensive and when you get to schools also there are no tools to use it.”*

P1 *“Well, the knowledge that I have is that I love YouTube I love being on the internet, so I use that knowledge that I must put it into my teaching, so it’s not something that I have been trained or good at. It’s something that I am always trying to tap into, to make things interesting for the children. It’s something that I think its beneficial for the future.”*

P2” No *I haven’t received the training, like I said I only did a module in Computer integration that was back in 2017, but I haven’t received training from the Department or anywhere else.”*

One of the strategic objectives of the e-Education policy on the use of ICT is that “Every teacher, manager, and administrator in General and Further Education and Training must

have the knowledge, skills and support they need to integrate ICT in teaching and learning” (DoE, 2004:29). However, these findings indicate otherwise. Participant 1 and 2 mentioned that the only training they received is from the university they attended and not the Department of Basic Education (DBE). Participant 3 mentioned that she was only encouraged to search for videos to use for her teaching and learning and that does not equate to proper ICT training.

4.6.3 ICT policy knowledge

The participants were asked which policy documents they refer to when integrating ICT into their teaching, and the responses indicated that they had no ICT policy knowledge.

P1 *“I just do it, I haven’t seen any policy it’s something that I have done for a while, something that I like but as for policies, I haven’t seen anything on that.”*

P2 *“Oh that one I don’t know; I have never ever heard of any policy.”*

P3 *“CAPS, it guides you to download videos about a certain theme for the week. It tells you that you can google a video related to the theme.”*

ICT policy planning in education exists in various levels; national departments, provincial and districts can develop ICT policies which provide how ICT integration in education should look (Fishman & Zhang, 2003; Jones, 2003). Both Participants 1 and 2 never heard of any policy on ICT integration. This suggest that they do not have any guidance on how ICT should be integrated in class and the tools to use. However, Participant 3 mentioned that she is guided by CAPS to download videos on Google. Although she is guided by CAPS to download videos, this does not provide sufficient knowledge on how she can integrate ICT tools.

Koehler et al. (2013) highlight that observations can be used to assess the teachers’ Technological Knowledge (TK). Therefore, using observations assisted in getting rich data and provided some light on Grade 1 teachers’ knowledge on the use of ICT to teach. All three participants were observed to assess their knowledge on the use of ICT.

Due to the limited ICT resources at their schools, participants used few ICT tools such as smartphones, Bluetooth speaker and YouTube. Using only a Bluetooth speaker and her smartphone, Participant 1 had the knowledge that she could search for the 'Nal'ibali' online program that had stories. She was then able to successfully connect her smartphone to the Bluetooth speaker because the sound from the speaker would attract learners and get all of them engaged. Learners were engaged and listened to the story and answered some questions.

Participant 2 used a laptop connected to the internet to present a Mathematics lesson for a number line. She went into the internet to search for a live worksheet and showed learners how to add using a number line. It is interesting that Participant 2 Chose to use a live worksheet instead of just a traditional worksheet to present her lesson. This means that she has the knowledge that a live worksheet will arouse the learners' interest compared to the drawn or printed one because learners get to see the moving pictures. However, the teacher struggled with engaging all learners in the lesson because the laptop screen was too small for a class of 40 learners (Farjiyah & Fauziyah, 2018).

Participant 3 used similar ICT tools as Participant 1. For her lesson, she showed the knowledge that YouTube is a resource that can be used in class to search for interesting songs for her theme "my body". She then played the interesting song from YouTube using her smartphone connected to the Bluetooth speaker. Although the smartphone screen was too small for the entire class, she got them to sit in a circle and showed them a video from YouTube; learners imitated what was happening on the video while listening to the sounds from the Bluetooth speaker. The use of YouTube helped learners to understand more because they could see the visuals and sound. Although this teacher never received formal training on the use of ICT, she was able to select the appropriate multimedia such as YouTube to use it on her Life-Skills lesson and enhance the learners understanding, as the CTML suggests.

4.7 Chapter summary

The data from observations, interviews, and document analysis combined to guarantee the accuracy and dependability of the data gathered and processed. In order to address

research questions, I cross-checked the participants interview responses with data gathered from class observations and document analysis. Data from observations, document analysis, and interviews were related to one another. A summary of the study's results, recommendations, and findings can be found in the following chapter.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The previous chapter presented the data and discussed findings derived from the study. This chapter provides a concise summary of the study, reflecting on the major findings. Recommendations for this study are based on the data analysed in the previous chapter.

5.2 Major Findings

The aim of the study was to explore the Grade 1 teachers' knowledge and use of ICT in selected North-West former Model-C schools.

The findings indicate that teachers involved in this study used ICT in their classrooms. These teachers had the knowledge that ICT has the power to improve learners' academic achievement and they were knowledgeable that these tools could be used to assist learners with barriers to learning. This is consistent with Shuro (2020) who pointed out that the use of ICT has improved the academic performance of learners experiencing barriers to learning. Participants were also knowledgeable that the combination of visuals and audio enhance learners understanding of the information presented just as the Cognitive Theory of Multimedia emphasised (Meyer, 1997; 2001). This was evident during class observations as participants used tools such as YouTube to develop learners understanding during their class presentations. Although teachers used ICT in their classrooms, they used basic tools such as smartphones, Bluetooth speakers and laptops. Teachers were able to manipulate and use these tools effectively into their lessons as this was observed during class observations. These tools were not part of their planning as there were not indicated in the ATP and lesson plans.

Findings on objective one: To identify ICT tools teachers in former Model-C schools use to teach in Grade 1.

To understand the ICT knowledge that teachers have, it is important to establish the type of ICT tools used. According to the e-Education policy, “every teacher and learner in General and Further Education and Training must have access to ICT infrastructure” (DoE, 2004:12). ICT tools are supposed to be available and accessible to all educational parties, especially teachers. Former Model-C schools were selected because they are quintile 4 and 5 with resources. However, findings from this study highlight that these schools did not provide Grade 1 teachers with ICT tools for integration in classrooms. Where ICT tools were provided, such as an overhead projector, they were dysfunctional and could not be used in the lesson. This shows that there is a lack of maintenance of ICT tools provided from either the school or government. Furthermore, all three teachers used similar ICT tools that were easily accessible to them. Teacher-owned ICT tools that were used by participants under this study are smartphones, laptops, and Bluetooth speakers.

Findings on objective two: To investigate how teachers in former Model-C schools use ICT to teach in Grade 1.

Teachers stated that they are using ICT in their teaching and learning and were observed on how they used it. ICT can be used in various ways by teachers, such as lesson preparations, presenting lessons and for assessment purposes (Kolobe & Mihai, 2020). Findings highlight those teachers only used ICT during lesson presentation; this is consistent with what Sahil and Uloyol (2016) emphasised – many teachers use readily available ICT resources for purposes such as class presentation. From the use of tools such as laptops, smartphones and Bluetooth speakers, teachers were able to engage learners in the lesson. Teachers used ICT tools such as smartphones and Bluetooth speakers to present English HL listening and speaking lessons. The same tools were used for presenting a Life Skills lesson and learners managed to be engaged in the lessons. Although the use of ICT in education is proven to promote learner-centred approaches, this was not the case with the teachers in this study. Teachers used their own personal ICT tools and therefore made it difficult for them to let learners manipulate the tools with them. Government, policy makers and school leaders need to support

teachers in the use of ICT in various ways. In order to ensure that teachers can prepare course materials themselves and integrating ICT effectively, there is a need to provide effective training (Sahil & Uloyol, 2016).

Findings on objective three: To assess the teachers' knowledge on the use of ICT to teach Grade 1 in former Model-C schools.

Waghe (2020) argues that it is essential for teachers to have relevant knowledge and skills to use new digital technology so that they can be able to help learners with the technological skills and knowledge. Teachers are unable to completely implement curriculum practice if they lack pertinent ICT knowledge. It is crucial to keep assessing teachers' ICT usage expertise to gather the data needed to create plans for improvement. Evidence from this study suggests that teachers have limited knowledge on the use of ICT in teaching and learning. Teachers indicated in the interviews that they have never received any training on using ICT on teaching and learning; hence, their knowledge on using ICT in classrooms is limited. Teachers were also unaware of policies that guide the use of ICT in education. Teachers mentioned that they did not have any knowledge of policies on the use of ICT in education. Without the relevant training on the use of ICT in education and relevant policies, this meant that teachers had to rely on their own self-taught knowledge.

This research on "Grade 1 Teachers' Knowledge and Use of Information and Communication Technology in Selected North-West Former Model-C Schools" revealed that teachers possess a limited knowledge of Information and Communication Technology (ICT) and their practical application in the classroom is also limited. These findings are consistent with Dlamini and Zenda (2022) as they found that many teachers lacked the relevant ICT knowledge. Teachers from this study are familiar with basic ICT tools, such as interactive whiteboards and educational software. They are also aware that the use of multimedia has some positive effects on the child's learning as stipulated in the CTML theory (Mayer, 1997). However, their use is often limited by a lack of continuous professional development and access to updated resources. The study highlighted a gap between teachers' theoretical knowledge of ICT and their ability to effectively integrate it

into their teaching and learning. Additionally, challenges such as inadequate infrastructure, limited technical support, and varying levels of digital literacy among teachers further hinder the effective use of ICT in Grade 1 classrooms. The findings underscore the need for targeted training programs and resource allocation to bridge these gaps and enhance the educational experiences of young learners through the effective use of ICT.

5.3 Limitations of the study

This study was successful completed, though there are some limitations which must be highlighted. The following limitations must be taken into consideration when interpreting its findings and generalising results:

- Not all schools in the North-West Province participated in the study. The study was limited to only three schools due to the nature of the study being a qualitative case study.
- The research was only limited to fee-paying schools situated in affluent areas. Therefore, the results are only limited to this type of schools and does not include non-fee-paying schools in rural areas.
- Additionally, the study participants were Grade 1 teachers with 5 years or more experience teaching the grade. The knowledge and use of ICT by Grade 1 teachers with less than five years' experience is not presented on this study.
- Another limitation is the research approach used for this study which was qualitative approach. Further studies can consider the use of mixed method or only quantitative approaches.
- The study also used purposive sampling and other studies can consider using probability sampling method with consideration of different provinces and different quantiles.

5.4 Implications and Recommendations for Policy, and Further Research

The recommendations suggested are based on the literature findings and empirical data.

5.4.1 Recommendations to the Department of Basic Education (DBE)

Studies indicate that teachers are experiencing challenges with integrating ICT into teaching and learning due to lack of knowledge and skills (Lobete, 2020; Shuro, 2020). Similarly, teachers from this study had limited knowledge on the use of ICT in teaching and learning. No ICT training was provided to capacitate them with the required knowledge to integrate ICT into their pedagogy. Therefore, they had to rely on their own limited knowledge to use ICT tools. Furthermore, ICT tools were not made accessible to teachers for them to use in classes and some of the tools were dysfunctional. As already stated in the problem statement, there is dire need to capacitate teachers with ICT knowledge. It is, therefore, the responsibility of the Provincial Departments to support their teachers through continuous ICT trainings and workshops. Furthermore, ICT tools needs to be made available to teachers to use them in their lessons. It is also important to ensure that they are maintained and repaired for the successful integration in class.

5.4.2 Recommendations to policy improvement

Findings suggest that policies, such as e-Education and the school-based ICT policy, are not available and not known by teachers. Policy makers must ensure that such policies are made available to teachers and that they are implemented. Furthermore, such a policy needs to be resuscitated to make it easier for teachers to follow it when using ICT in teaching and learning. CAPS document is the policy used by teachers. However, this policy document is silent about the integration of ICT into the teaching and learning of subjects. CAPS needs to be revised to include specific guides on how teachers can use ICT into specific subjects. ICT should be incorporated as an important pedagogical method to facilitate learning. Finally, there should be school-based ICT policy in place in all schools. Such a policy should outline how teachers can use ICT resources to improve the skills required for effective ICT usage in classrooms.

5.4.3 Implications for further research

This study was only limited to three former Model-C schools with a total of three participants in the Ngaka Modiri Molema District. A much bigger demographically representative sample is recommended for future studies. Future studies may also focus

on the type of ICT training to be provided to teachers to equip them with the required ICT knowledge. Furthermore, research can also focus on what can be done to ensure that schools have the provided ICT tools that teachers can use in their classrooms. Finally, the SMT plays an important role in ensuring that teachers have the required ICT knowledge and are provided with ICT tools. Therefore, studies can be conducted to the roles of SMT in making sure that there is ICT integration in teaching and learning process.

5.5 Conclusion

The study's objective was to explore the Grade 1 teachers' knowledge and use of ICT in selected North-West former Model-C schools. Former model-C schools were purposively selected as the study's research site because these schools are fee-paying schools ranked between quintile 4 and 5. There is a belief that these types of schools have resources that teachers can use in their classrooms and that includes ICT tools. However, the findings of this study indicate that although these schools were based in affluent areas and ranked in higher quintiles, teachers were not always provided with ICT tools to use. Furthermore, teachers only had general knowledge about the influence that ICT has on students' academic achievement. Teachers were willing to use ICT and used their own ICT tools such as smartphones, laptops, and Bluetooth speakers for their lesson presentation. The DBE needs to make sure that teachers receive sufficient training to equip them with the required ICT knowledge. Educational policies should be implemented and made available to teachers for reference when using ICT in their classrooms.

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APPENDIX A: LANGUAGE EDITING



EditMach using English the
writer way

*Editing and proofreading services for
academic articles/papers & dissertations*

Jennifer Sheokarah

083 287 2456

jennifer_sheokarah@yahoo.com

TO : Mr Moses Letsapa (MED student: 2020880221)
FROM : Dr Jennifer Sheokarah
SUBJECT : Dissertation editing
DATE : 19 April 2024

**Grade 1 Teachers' Knowledge and Use of Information and Communication
Technology in Selected North-West Former Model-C Schools**

The above dissertation was edited.

While I have corrected spelling and language errors (punctuation, tense, concord, word choice, and word order) I have not edited any quotations. I have also not checked that the sources indicated in your reference list are all contained in the body of the document or that these sources are cited correctly.

Ideas expressed have not been altered in any way. Track changes have been used for your perusal – changes can be rejected or accepted as you see fit.

Sincerely

J Sheokarah

Jennifer Sheokarah
Language Editor

APPENDIX B: PLAGIARISM REPORT

Moses Letsapa dissertation.

ORIGINALITY REPORT

6%

SIMILARITY INDEX

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INTERNET SOURCES

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PUBLICATIONS

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STUDENT PAPERS

MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

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★ Ageel, Mohammed. "Using a virtual learning environment to increase the use of information and communication technology by university teachers at Jazan University, Saudi Arabia", 2013

Internet Source

Exclude quotes On

Exclude matches < 40 words

Exclude bibliography On

APPENDIX C: ETHICAL CLEARANCE APPROVAL



GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

07-Mar-2023

Dear Moses Letsapa

Application Approved

Research Project Title:

Grade 1 teachers' knowledge and use of Information and Communication Technology in selected North-West former model-C schools

Ethical Clearance number:

UFS-HSD2022/1897/23

We are pleased to inform you that your application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. We request that any changes that may take place during the course of your study/research project be submitted to the ethics office to ensure ethical transparency. Furthermore, you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for submitting your proposal for ethical clearance; we wish you the best of luck and success with your research.

Yours sincerely

Dr Adri Du Plessis

Chairperson: General/Human Research Ethics Committee

Adri
Du
Plessis

Digitally
signed by Adri
Du Plessis
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APPENDIX D: CTR APPROVAL



18 October 2022

APPLICATION FOR TITLE REGISTRATION

Applicant: Letsapa, M
Student Number: 2020880229
Discipline: Curriculum Studies
Study Code: Master's (EDCI8900)

Dear Mr Letsapa

Your registered title is as follows: "Grade 1 teachers' knowledge and use of Information and Communication Technology in selected North-West former model-C schools"

All of the best with your studies.

Yours sincerely,

Prof Patrick Mafora
Chair: CTR committee

Ms CS Duvenhage
Secretary: CTR committee

205 Nelson Mandela Drive | Park West, Bloemfontein 9301 | South Africa
P.O. Box 339 | Bloemfontein 9300 | South Africa | www.ufs.ac.za



APPENDIX E: CONSENT LETTER



Research study information leaflet and consent form

Date

04 November 2022

Title of the research project

Grade 1 teachers' knowledge and use of Information and Communication Technology in selected North-West former model-C schools

Principle investigator / researcher(s) name(s) and contact number(s):

Name of student /researcher	student number	Contact number
Moses Letsapa	2020880221	0793241206

Faculty and Department:

Faculty of Education
Department of Curriculum Studies and Higher Education

Study leader(s) name and contact number:

Prof T Jita (0829698)
051 401 7441

The study aims to explore the Grade 1 teachers' knowledge and use of ICT in selected North West former Model-C schools.

My name is Moses Letsapa; I work for the North-West department of education as a teacher in one of the primary schools in Ngaka Modiri Molema district. I am presently studying for a Master's degree in Curriculum Studies with the University of the Free State, and as part of my Master's program I am required to conduct research on an aspect of interest with a purpose of contributing to the knowledge and understanding of the issue under study.

This study has received approval from the Research Ethics Committee of UFS. A copy of the approval letter can be obtained from the researcher.

Approval number: UFS-HSD2022/1897/23

You have been chosen as participants for this study because you are a Grade 1 teacher with more than five years' experience and teaching at a former model-C schools. Therefore you are regarded as a person who can give information on this study. I have obtained your contacts from your principal as the manager of this school and asked permission from them to contact you. In total, this study will consist of three participants with other two teachers from different schools.

Your role in this study will be to provide me with documents such as your lesson plans, ATP's and to answer semi-structured one-on-one interviews with me. The type of questions that will be asked include questions such as the type of ICT you use in your class, how you use it and the ICT knowledge



that you have. These interviews will take place at an arranged time after school hours and will last between 30-45 minutes. Finally the interviews will be recorded using audio tape recorder and later be analysed by me. Your participation in this study is voluntary and there is no penalty or loss of benefit should you decide not to participate. If you decide to participate, I will give you information sheet to keep and sign a written consent form. You are free to withdraw from this study at any given point without disclosing a reason.

These study's benefits are meant for educational purposes as they will also assist you in using ICT effectively in your teaching and learning. Furthermore your information will be kept anonymous and confidential. This study does not have any potential risks since data collection will be conducted in your school after school hours with other colleagues around in the school premises

The information you give on this study will be kept confidential as your name will not be mentioned. Your responses will be given fictitious codes and no one will be able to connect it to you. Your responses will only be given to the external auditor to ensure the credibility of my analysis. Hard copies of your answers will be stored by the researcher for a period of five years in a locked cupboard/filing cabinet in the office for future research or academic purposes; electronic information will be stored on a password protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. Hard copies will be destroyed by burning and electronic copies will be deleted after a period of five years. Participating in this study involves no payment, but educational benefits.

If you would like to be informed of the final research findings and require any further information or want to contact the researcher about any aspect of this study, please contact Moses Letsapa on 0793241206 or email 2020880221@ufs4life.ac.za. The findings are accessible for a period of of five years5 years. Should you have concerns about the way in which the research has been conducted, you may contact Prof Thutukile Jita on 0514017441 or jita@ufs.ac.za .

Thank you for taking the time to read this information sheet and for participating in this study.

Consent to participate in this study

I, the undersigned,

_____ (participant's full names to be included), (the "Participant")
confirm that I voluntarily agree to participate in the research study referred to as the

_____ (the "Study") in relation to

_____ and which Study is being conducted by

_____ (Moses Letsapa), (the "Researcher").

I, the undersigned Participant, further confirm that-

1. the Researcher has explained the nature, procedure, potential benefits and anticipated inconvenience of my participation in the Study;
2. I have read (or had explained to me) and understood the Study as explained in the attached information sheet;
3. I have had sufficient opportunity to ask questions and am prepared to participate in the Study;
4. I understand that my participation in the Study is entirely voluntary and that I am free to withdraw at any time without penalty (if applicable);
5. I voluntarily provide the UFS and the Researcher with my personal information and consent to the UFS and the Researcher collecting, disclosing and processing my personal information in order to conduct the Study and any related activities in relation thereto;
6. I hereby acknowledge and confirm that I understand the purpose for which the UFS and the Researcher may collect, store, use, delete, destroy, outsource, transfer or otherwise process, as the context and circumstances may require and as contemplated in terms of POPIA, my personal information as set out herein;
7. I am aware that the findings of the Study will be anonymously processed into a research report, journal publications and/or conference proceedings and that my personal information will be aggregated and deidentified at such stage;
8. I also give the UFS permission to share, without notification, the collected data with other researchers at the UFS or other Higher Education Institutions. This permission is dependent on the same principles of ethical research practices, anonymity/confidentiality, safekeeping of information, and other issues listed above applying.

I, the Participant, agree to the recording of the <insert specific data collection method>.

Full Name of Participant: _____

Signature of Participant: _____ Date: _____

Full Name(s) of Researcher(s): _____ Moses Letsapa

Signature of Researcher: _____ Date: _____

APPENDIX F: PERMISSION TO CONDUCT RESEARCH



education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

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OFFICE OF THE DISTRICT MANAGER: NGAKA MODIRI MOLEMA DISTRICT

Enquiries: Ms S.O. Molete
Tel: 018 388 1964
Email: omolete@nwpg.gov.za

To : Sub District Managers
Circuit Managers

From : Mr S.D. Ntlabathi
District Director

Date : 02 February 2023

PERMISSION TO CONDUCT RESEARCH IN SCHOOLS IN THE DISTRICT

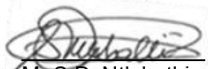
Permission is hereby granted to **Mr M. Letsapa (2020880221)**, who is a student registered at the University of Free State, to conduct a research under the title: "**Grade 1 teachers' knowledge and use of Information and Communication Technology in former Model C School**".

Permission is granted on the basis that:

- Prior arrangement is made with School Managers to avoid disruption of formal learning and teaching and that necessary safety precautions are followed.
- Participants will volunteer to participate on the research
- Data collected may not be used as bad publicity that may put the Department into disrepute

Your cooperation and support in this regard is highly appreciated

Yours in Education,


Mr S.D. Ntlabathi
District Director



Let's Grow North West Together



APPENDIX G: INTERVIEW PROTOCOL

Interview protocol

1. Background information
 - a. What qualifications do you have?
 - b. How many years have you been teaching Grade 1?
 - c. When did you start teaching altogether?
2. What do you know about Information and Communication Technology (ICT)?
3. Do you have ICT tools in your school?
 - a. If yes, please indicate which ICT tools do you have?
4. Which ICT tools do you use in your teaching and learning and for which subjects?
 - a. Why do you prefer to use these specific ICT tools for these particular subjects?
5. Briefly explain how you use these ICT tools in your class.
6. Which policies guides you on the use of ICT in your teaching and learning?
7. What are some benefits of using ICT in your class?
8. When did you start using ICT in your teaching and what motivated you to use it?
9. Were you trained to use ICT in your teaching and learning?
 - a. If yes, please indicate where and briefly explain the type of training you received.

10. Tell me about any knowledge you have regarding using ICT in teaching and learning.
11. What are some of the challenges you have with ICT and using it for teaching and learning?
12. What would you like to know more about the use of ICT on teaching and learning in grade 1?
13. How do you think the use of ICT in teaching and learning can be improved?

APPENDIX H: OBSERVATION PROTOCOL

Class Observation protocol

Date and time	Participant	Situation analysis	Type of ICT used, and its usage	Reflection

APPENDIX I: DOCUMENT ANALYSIS PROTOCOL

Document analysis protocol

Document	The document's Information about ICT in teaching and learning	Teachers' implications	Learners' implication

Lesson plan analysis protocol

Participant	Subject	Lesson topic	Type of ICT tools used for teaching and learning	How are ICT tools used for teaching and learning