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Teacher Experiences of Using Digital Technology to Support Reading Development in Grade 1 Learning Contexts

Qudsiyyah Dadabhai

Supervisor: Dr C. D. Martin

A dissertation submitted to the Wits School of Education, Faculty of Humanities, University of the Witwatersrand in fulfilment of the requirements for the degree of Master of Education (by dissertation).

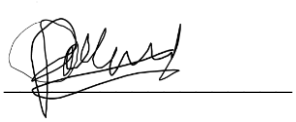
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June 2024

Plagiarism Declaration

I, Qudsiyyah Dadabhai, student number 1837851, declare that this dissertation is my own and original work.

I also declare that all the sources that I have referred to or quoted from have been acknowledged through in-text referencing and in the reference list.

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



Qudsiyyah Dadabhai

30 June 2024

Acknowledgements

First, I would like to thank the Almighty for granting me the knowledge and opportunity to complete this research study. I would also like to extend my sincere thanks to Dr Colwyn Martin for her vast knowledge, suggestions, support, patience, and supervision that helped in the completion of this dissertation. Further, I could not have undertaken this journey without my parents' and siblings' motivation. They have been my constant pillar of strength, support and incentivisation. Their moral and emotional support, words of encouragement and kindness allowed me to persevere through the challenges faced throughout this study. I would like to extend my sincere thanks to my participants and by extension their respective schools, for sharing their views and beliefs, their time and allowing me into their classrooms to observe lessons - this study would not be possible without your input.

Dedication

I dedicate this to my mother, father and siblings. Thank you for encouraging me to complete this academic journey. You were my mental, physical and emotional support throughout the process.

Abstract

The 2021 Progress in International Reading Literacy Study (PIRLS) revealed a literacy crisis in South Africa, with 81% of Grade 4 learners unable to read for meaning in any of the nine official languages. Research suggests that the perceptive use of digital technology can enhance reading proficiency. This qualitative study examined teachers' experiences of using digital technology to support reading development in Grade 1 classrooms in South Africa. Using the TPACK framework, semi-structured interviews and classroom observations were conducted with four Grade 1 teachers in Johannesburg. Findings revealed that teachers' technological knowledge varied significantly, influencing their integration of digital technology into reading lessons. Several factors inhibited teachers' use of digital technology, including varying levels of technical expertise, inconsistent stakeholder support, classroom management challenges, difficulties in balancing books and screens, and the emotional labour associated with using technology to support reading development. While digital technology shows potential for improving reading comprehension and fluency, its effective implementation is hindered by contextual limitations and the need for specialised teacher training. The lack of support from schools, parents, peers, and other relevant stakeholders prompted teachers to exercise agency in integrating digital technology into reading instruction, albeit with difficulties. The study highlights the importance of formal training to effectively incorporate digital technology into Grade 1 reading spaces. Additionally, it emphasises the need for comprehensive support from all stakeholders to facilitate the integration of digital technology into classroom lessons, ultimately aiming to improve reading proficiency in Grade 1.

Keywords: digital technology, integration, TPACK, fourth industrial revolution, professional training

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LIST OF ABBREVIATIONS & ACRONYMS

4IR	Fourth Industrial Revolution
AI	Artificial Intelligence
Apps	Applications
CAPS	Curriculum Assessment Policy Statement
CK	Content Knowledge
COVID-19	Coronavirus Pandemic
DBE	Department of Basic Education
ECD	Early Childhood Development
FP	Foundation Phase
ICT	Information and Communication Technology
LoLT	Language of Learning and Teaching
PCK	Pedagogical Content Knowledge
PK	Pedagogical Knowledge
SA	South Africa
SMTs	School Management Teams
TCK	Technological Content Knowledge
TK	Technological Knowledge
TPACK	Technological Pedagogical Content Knowledge
TPK	Technological Pedagogical Knowledge
Wi-Fi	Wireless Fidelity

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CHAPTER ONE

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

This study presents qualitative research findings that emanated from exploring Grade 1 teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts. In today's landscape the use of technology within educational settings has attracted much interest (Raja & Nagasubramani, 2018). I focused on Grade 1 teachers' understandings of what digital technology entailed, the availability of technological resources, how teachers applied digital technology in their lessons, and the challenges and opportunities that exist in utilising digital technology in teaching contexts. Within the context of this study, digital technology refers to electronic devices such as projectors, televisions, desktops, laptops, iPads, smartphones and tablets to access social media, multimedia, various applications (apps), and internet programmes (Spiteri & Chang Rundgren, 2020).

In order to situate the study, this chapter outlined the research landscape regarding the correlation between reading development and digital technology. This not only provided the background, but also motivated the rationale for the study, including the research aim and objectives, and research questions that guided this research project. Also, to make-sense of the collected data, an overview of the theoretical framework and methodological design are provided. Lastly, the layout of each chapter, as well as the conclusion to this chapter are presented.

1.2 BACKGROUND

We are part of a rapidly changing world; the world 15 years ago was very different from what we encounter today. Schwab (2017, p.1) who coined the term, *Fourth Industrial Revolution* (4IR) asserts that technology has created a society that is highly connected, such that the lives of people increasingly revolve around the use of information technology.

The 4IR has precipitated revolutionary processes such as gene-sequencing which engages the domains of the physical, digital, and biological to promote a better understanding of ourselves, and to create something new. In the current era, new technologies are constantly being created and replacing each other, stimulating different productive forces leading to societal, economic and social changes. Accordingly, digital technology has become increasingly important and relevant in educational settings (Raja & Nagasubramani, 2018). In

this regard, Butler-Adam (2018) and Scepanovic (2019) contend that education systems need to be re-examined to prepare children to solve daily complex, dialectical, and interconnected challenges so as to transform their lifeworld. Digital technology's significant contributions to teaching and learning need to be understood and recognised.

Internationally, there is a plethora of research studies on the use of digital technology in education. Neumann (2018) asserts that digital technology can be found in various forms in the educational space from Early Childhood Development (ECD) stages to Grade 12 settings, and even more commonly in tertiary education. Young children are able to use the touch-based interface of iPads, tablets, and mobile phones to interact with the digital world before they are even able to coherently communicate (Ibid, 2018). Their interactions on these devices are based on the continuous simulation provided by such forms of digital technology. While in many ways it can be seen as something negative, there are tremendous opportunities to understand about any topic which is beneficial and interesting to the child. Digital technology, when used correctly, has the potential to significantly improve learning outcomes (Lewin et al., 2019).

It is imperative that teachers develop a clear understanding of digital technology in terms of how it works, and the pedagogical practices that support it as a teaching and learning tool to maximise learners' opportunities to enhance their academic performance. Sailer et al. (2021) recognise that being surrounded by digital technologies does not necessarily equate to effectively using them for our benefit; instead, digital skills need to be developed effectively - first by the teacher who can then apply them to educate and empower learners. Teachers need to develop various strategies when using digital technology in the classroom to promote learner-centred lessons which will enhance teaching and learning outcomes (Raja & Nagasubramani, 2018). Digital technology has the ability to assist teachers in addressing a wide variety of individual needs within a single classroom which is achievable because teachers can now effectively plan lessons with activities that focus on individual learner-capacity, pace, and unique needs (Sailer et al., 2021). Further, to combat the increasing number of barriers to learning, technology could also be a powerful tool to support inclusivity and diversity. Hence, this needs a teacher who is well-versed, skilled, and comfortable in using digital technology for best practice.

The use of digital technologies in schools is becoming widespread across the globe where robotics and coding, and the use of Artificial Intelligence (AI) are becoming part of the

curriculum (Butler-Adam, 2018). South Africa (SA) is no different since it aims to include learners to become actively involved in the 4IR. An amendment to the Curriculum and Assessment Policy Statement (CAPS) aimed for its implementation in 2023 and provided time to be allocated for coding and robotics (Department of Basic Education [DBE], 2021). According to the DBE's (2021, p. 12) amendment, the aim was to guide and prepare learners to "solve problems, think critically, work collaboratively and creatively, function in a digital and information-driven world, apply digital and ICT skills and to transfer these skills to solve everyday problems and its possibilities, including equipping learners for meaningful and successful living in a rapidly changing and transforming society". This reveals that the trajectory is geared to focus on a more technological model of schooling within SA as the migration to digital technology transformed many of the educational systems to enhance learner-performance (Kalolo, 2019).

While the transition to embrace digital technology in SA will be one fraught with challenges, the issue of literacy levels (reading for comprehension) remains a perpetual topic of debate. According to the South Africa PIRLS Literacy 2021 report by Mullis et al. (2023), reading-for meaning is a grave challenge. Disappointingly, SA was placed among the last 50 countries with literacy scores indicating that 81% of Grade 4 learners did not have basic reading skills; that is, they could not read for meaning which exposed the shocking nature of the standard of education in SA (Mullis et al., 2023). Baron (2017) emphasises that reading is key to understanding and communicating with the world; hence, utilising digital technology will act as a tool to increase the level of literacy in SA. Since digital technology already has the capacity to capture the attention of young learners, their interactions should enhance teaching-learning, specifically learners' grasp of essential skills in reading. There is much which can be done to improve reading, and according to research by Biancarosa and Griffiths (2012) and Brüggemann et al. (2023), digital technology may be the ideal tool to promote literacy.

Further, Neumann (2018) explains that when young learners access apps on their devices, the fostering of emergent literacy skills occurs through their exploration of icons, symbols, words and letters. The development of salient literacy skills such as the concept of print, alphabet knowledge, and phonological and phonemic awareness (among others) are critical as they immensely influence future reading and writing abilities (Lonigan & Shanahan, 2010). Also, Thoermer and Williams (2012) confirm that digital texts can increase learners' reading proficiency by assisting them to read with fluency. Additionally, electronic books stimulate

learners' desire to read, especially through interactive pictures within different reading apps (Ciampa, 2012). Moreover, reading digitally capacitates a learner to multitask because while reading, cognitive processes of decoding and comprehending the text simultaneously occur (Baron, 2017). These, among others, are different ways in which teaching to read and reading through the use of digital technology can help improve the literacy and reading development of children. Given the unequal system of education of the past which resulted in poor reading skills among the disadvantaged in SA, reading proficiency can be an uphill battle without the assistance of digital technology.

Jannah, Prasojo and Jerusalem, (2020) and Venketsamy and Hu (2022) contend that teachers' attitudes, preparedness, and ability to use digital technology impact on the effectiveness of its use. This is understood as a problem which is hindering the effectiveness of utilising digital technology in classrooms. This can be attributed to the gap in teachers' knowledge, and personal experiences pertaining to the use of digital technology to enhance reading development among learners.

1.3 RATIONALE FOR THE STUDY

Lamentably, SA is facing a catastrophic reading crisis. Statistics from the 2021 PIRLS study indicates that most children in SA do not meet the minimum international reading standard when assessed according to their specific grade (Mullis et al., 2023). Since the migration to the 4IR landscape catapulted technology as a necessity to facilitate daily living, SA in an effort to capacitate our learners to become au fait with the 4IR's requirements, introduced and amended policies to guide the implementation of digital technology into the schooling system. The *White Paper 7 on e-Education* states that the introduction of ICTs into classrooms "is creating new ways for students and teachers to engage in information-selection, gathering, sorting and analysis" (DBE, 2004, p. 6). The push towards digital technology is accelerated by the amendment to the CAPS document to include coding and robotics as different forms of digital technologies to be taught in classrooms (DBE, 2021). Additionally, international research by Baron (2017) and Ciampa (2012) reveals that digital technology, if used astutely with simple and appropriate instructions, can enhance reading proficiency. This is due to many factors which include the keen interest children exhibit when accessing digital technology (Haleem et al., 2022).

As a practising educator, I observed this while teaching young children who were maximally engaged when interacting with digital tools to problem-solve. I have found that learners are

very interested and captivated by the use of digital technology in the school environment and outside of it. Digital technology in its many forms has the capacity to captivate learners of all ages and all ability groups in a way that many teachers are not able to do so. This made me curios to research the use of digital technology in an educational setting. As I am aware of the reading crisis in SA, I was particularly interested in seeing how digital technology is used to support reading development. As the early years, Grade R and Grade 1 are understood as the start of the learning to read process and is salient in the learning to read process, I decided on Grade 1 as the Grade of which to focus on when conducting my research. However, I recognised that teachers played a significant role in the learner's use of digital technology as a result this prompted me to look at teachers experiences of using digital technology to support reading development in Grade 1 learning contexts. Since the research rationale is significant to every academic pursuit, it guides me to unlock the unexplored areas of my field such as exposing the gaps in existing knowledge, this study intended to offer potential contributions that promote the use of technology to foster reading development.

Despairingly, South African research is largely lacking regarding teachers' experiences of utilising digital technology, specifically as a support tool for reading development. This literature gap prompted the necessity for this study. Hence, I undertook to investigate Grade 1 teachers' experiences of using digital technology to support reading development and understand how their experiences of using it to support reading development leads to the emergence of new insights and understandings.

Given the scenario of the reading crisis in SA as well as the push to use technology, there was the crucial need to explore how digital technology is used to support Grade 1 reading development. I was interested in interrogating teachers' experiences so as to gauge if they needed to adapt their teaching practice to include technology in the delivery of lessons. As a Foundation Phase (FP) teacher interested in the pedagogical practices of teaching reading in Grade 1, this study was expected to contribute to new knowledge, and to both my personal and professional development. However, the study used private schools as research sites which meant that the findings could not be generalised for all South African schools. This was because in SA we have the major issue of inequality relating to the digital divide, access, resources, and loadshedding. The schools chosen for this study have minimal to no challenges regarding access to different forms of digital technology tools, as each learner had access to a digital device – there was no need to share. Additionally, the schools all have access to uninterrupted access to Wi-Fi despite loadshedding. Although there are some

Government schools which use digital technology in their schools, there are many issues with connectivity (Wi-Fi and data) and having a sufficient number of devices for all learners in the class. Venkatsamy and Hu (2022, p.221) add that "teachers experienced challenges due to the lack of knowledge and understanding of how to use technology effectively for teaching and learning, a lack of support from management to promote the use of technology, and inadequate and outdated technological resources and equipment".

I accessed private schools as my research sites as I wanted to contribute to the body of knowledge; hence, this study was based on the subject of digital technology influencing reading development which links to my professional development pursuit.

1.4 SIGNIFICANCE OF THE STUDY

The particular significance of this study lies in its aim to address research gaps within the South African context and globally. As there is minimal research in South Africa done on teachers experiences of using digital technology to support reading development in Grade 1 learning contexts. Additionally, globally the research that is done is on teachers experiences of using digital technology to support literacy development- it does not focus specifically on reading development and the early years i.e. the Grade 1 learning contexts. As a result, my research contributes to the global research on teachers experiences of using digital technology to support reading development, while including the specifics of the Grade 1 learning contexts, and the South African research context, as my research was done in South African schools. This study makes some important contributions to teachers' use of digital technology within the Grade 1 context on reading development.

1.5 PROBLEM STATEMENT

SA is facing a catastrophic reading crisis. The 2021 PIRLS results indicated that 81% of Grade 4 learners cannot read-for-meaning, which perpetuates the educational inequalities within the country (Mullis et al., 2023). Since research by Schwab (2017) and Damşa et al. (2021) on 4IR indicates that the world is continuously and speedily transitioning towards technology, this study explored how Grade 1 teachers use digital technology to support the reading development of the learners in their classrooms.

1.6 RESEARCH AIM

This study aimed to explore teachers' experiences of using digital technology to support reading development in Grade 1 South African learning contexts.

1.7 RESEARCH OBJECTIVES

- To explore teachers' perceptions of using digital technology to support reading development in Grade 1 learning contexts;
- To identify challenges teachers experience when using digital technology to support reading development in Grade 1 learning contexts; and
- To examine how Grade 1 teachers' experiences of utilising digital technology to facilitate reading development in their classrooms lead to the emergence of new insights and understandings?

1.8 RESEARCH QUESTIONS

- What are teachers' perceptions and experiences of using digital technology to support reading development in Grade 1 learning contexts?
- What challenges do teachers experience when using digital technology to support reading development in Grade 1 learning contexts?
- How do Grade 1 teachers' experiences of utilising digital technology to facilitate reading development in their classrooms lead to the emergence of new insights and understandings?

1.9 LITERATURE STUDY: AN OVERVIEW

During the 21st century, digital technology became embedded in our lives. Accordingly, it has become a revolutionary beneficial tool in education which plays an important role in supporting teaching-learning processes (Raja & Nagasubramani, 2018). Its use within classrooms internationally and within SA needs to be examined closely to see the holistic picture. This will specifically focus on teachers' experiences of using digital technology as a support tool to enhance the quality of reading.

1.9.1 Digital Technology as an Educational Tool

Singh (2021, p. 21) postulates that "the integration of digital technology in education is to transform teaching and learning into an enriching process for both teachers and students". This is confirmed by Sailer et al. (2021, p. 1) who explain that digital technology opens the doors for social inclusion in today's society and "offers diverse opportunities for both students and educators to support teaching and learning processes". As such, digital technology as an educational tool is multifaceted because when it is introduced into the classroom, the sources of knowledge become multifarious as the teacher is no longer the sole source of knowledge (Singh, 2021). This then increases the flow of information, increases the

speed at which information is accessed, and widens the bank of knowledge available to learners at any given moment.

Digital technology as an educational tool has many advantages, as well as some drawbacks. As children of all ages are interested in technology, its use in the classroom makes them eager to learn (Raja & Nagasubramani, 2018). While utilising these devices as educational tools learners develop new skills to gain new knowledge relevant for daily living and to succeed in a digital world. It is acknowledged in education that learners work at different speeds; hence, digital technology allows this uniqueness by being monitored and supported by the teacher. The introduction of digital technology into the classroom makes lessons livelier, interactive, creative, and dynamic which improves learners' productivity, ability, and willingness to learn (Singh, 2021). The endless possibilities provided by digital technologies in the educational space need to be harnessed astutely in order to derive maximum benefit to enhance teaching-learning situations (Sailer et al., 2021). However, the advent of digital technology is not without challenges. Singh (2021) observes that not all learners are able to absorb knowledge from a technological platform compared to being guided face-to-face by a teacher. Additionally, due to the nature of digital devices, learners may get easily distracted and lack focus when using them (Sailer et al., 2021). Moreover, Raja and Nagasubramani (2018) mention that the overuse of digital technology in any environment is detrimental as it results in the user experiencing physical pains, becoming overstimulated, obsessive, and drained. As such, its use within the educational space needs to be carefully monitored to ensure that learners derive the maximum benefit from its utilisation by avoiding the negative effects.

1.9.2 The Use of Digital Technology in Education Internationally and in South Africa

Extensive research (Ankiewicz, 2019; Ciampa, 2012; Lewin et al., 2019; Sailer et al., 2021; Singh, 2021) has been conducted internationally on the use of digital technology in education, primarily in the Global North. The areas of research range from pre-formal schooling in the ECD context to higher education contexts. Internationally, digital technology is used in a manner which reduces the gap between the traditional manner of teaching-learning and the modern approach which is replete with principles of sustainability, human rights, and dignity (Islam Sarker et al., 2019). Since societies develop through the use of digital technology, education is thus the starting point for "the competent and conscious application of Artificial Intelligence (AI) technologies, neural networks, and other cyber-physical systems based on AI, as well as robots and robotics objects" (Barakina et al., 2021, p. 258).

However, digital technology utilisation in developing countries such as in SA differs substantially from developed countries. There are far more challenges confronting the use of digital technology in developing countries due to inadequate infrastructure, resources, and access, among others (Kalolo, 2019). Despite these challenges, developing countries continue to integrate digital technology into their education systems through policies and guidelines so as not to be left behind in this rapidly evolving technological world (Venketsamy & Hu, 2022). However, in SA, the digital divide is widening despite the Government's attempts to address it. It has become evident that the implementation of digital technology into the SA system of education has become challenging for various socioeconomic reasons. Fortunately, the SA Government's attempts at improving the quality of teaching and learning are ongoing, despite the challenges and the limited amount of research conducted. This means that we cannot ignore the relevance of technology in education; so, we must look at using it most effectively.

1.9.3 Teachers' Experiences of Using Digital Technology

In order for digital technology to be effectively utilised in classrooms, teachers should possess a thorough understanding of technological devices and how they can be maximally exploited to enhance teaching and learning in classrooms. Madsen, Thorvaldsen and Archard (2018) maintain that initial teacher education must relate to digital developments in relation to a specific field such that teachers can confidently identify with it. In theory this is easier said than done, but not in practice; there is a gap between what teachers are supposed to do, and what they are actually practising (Madsen et al., 2018). This is primarily because teachers' knowledge, perceptions, attitudes, and skills impact on their practice (Spiteri & Chang Rundgren, 2020). Teachers often have difficulty in adapting to the daily use of digital tools, and in some cases find it difficult to accept that learners may be more adept in using digital technology than they are. Hence, teachers may develop a negative attitude towards the use of digital technology as they see it as a threat which is replacing them by reducing teaching time, instead of seeing it as a tool to enhance teaching and learning (Spiteri & Chang Rundgren, 2020). In sum, teachers' perceptions, experiences, and competencies of using digital technology in the classroom directly correlates to it being effectively used in the classroom (Jannah et al., 2020).

1.9.4 Digital Technology to Support Reading Development

Digital technology has become an integral part of our daily lives such that it has reshaped the way learners "read, write and access information in school" (Baron, 2017, p. 15). As such, in

its many forms, it plays a crucial role in supporting reading development. Digital books which are easily accessible can help develop reading skills through its interactive features including highlighting words as they are read aloud. Learners can then with ease match the written word to the spoken word. Similarly, there are many reading features that can be downloaded on mobile devices which provide engaging activities to assist learners to read with understanding. These are customised to meet individual learner needs by allowing the speed of reading to match the learner's pace, while some apps even pick up errors when learners read aloud into it. Ciampa (2012) maintains that electronic books significantly enhance young learners' motivation to read. Further, digital technology can be a valuable tool in supporting reading development because it provides interactive and engaging materials that cater for different learning styles and diverse abilities. However, it is important to take into cognisance that digital technology should not replace traditional reading materials, but rather supplement them. This too has implications for teachers as they need to be aware of how digital tools reshape learners' understanding of what it means to read with meaning; hence, a blend of both traditional and digital tools may be ideal (Baron, 2017).

1.10 THEORETICAL FRAMEWORK AND METHODOLOGY: AN OVERVIEW

The theoretical framework that underpinned this study was the Technological Pedagogical Content Knowledge (TPACK) model which was developed by Mishra and Koehler (2006). The TPACK model helps teachers integrate technology into their teaching practices. The TPACK model combines three types of knowledge: Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK). Content knowledge refers to teachers' understanding of the subject matter they are teaching, including pedagogical knowledge concerning teaching strategies and methods, while technological knowledge refers to the teacher's understanding of how to use technology effectively (Mishra & Koehler, 2006). Thus, effective teaching with the aid of technology requires a fine balance between the above three types of knowledge (Roussinos & Jimoyiannis, 2019).

The connection between reading pedagogy and the TPACK model lies in incorporating technology into reading instruction. The TPACK model emphasises that teachers should thoroughly understand the integration of content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK). In the context of reading pedagogy, the TPACK model highlights the importance of teachers effectively utilising tools and resources to enhance learners' reading and comprehension abilities while interacting with digital texts, reading platforms, online resources, and educational apps to create captivating and

personalised learning experiences. Lastly, the TPACK model applied in this study facilitated the structuring of the research questions for the semi-structured interviews in order to collect rich data for analysis to determine how teachers plan and develop their reading lessons to promote literacy.

The methodology of this research study was a qualitative approach within an interpretivist paradigm (Cohen, Manion, & Morrison, 2018) because it focused on the subjective experiences of individuals (Merriam & Tisdell, 2016). It was developed on both observation and interpretation frameworks: observation refers to collecting information about events, while interpretation refers to making-meaning of that information through deducing the correlation between the information and possible patterns (Cohen et al., 2018). In this way, the interpretive paradigm assists in understanding phenomena through the meanings people attach to them; hence, it was appropriate for this study because teachers' experiences of using digital technology to support reading development was unpacked in this study.

This study's qualitative approach facilitated the exploration of teachers' utilisation of digital technology when teaching reading in Grade 1 classrooms. Qualitative research, which allows for the exploration and understanding of a social problem (Creswell & Creswell, 2018), involves the construction of questions in line with specific processes such that data is collected within participants' settings. This data is then analysed inductively by progressing from the particular to the general themes which allows the researcher to make-sense of it in order to interpret the data (Creswell & Creswell, 2018). The significance of selecting the qualitative research approach for this study related to the intention of the researcher to gain an incisive insight into the lived-experiences of teachers' experiences in using digital technology to support reading development. This was done through the use of semi-structured interviews and informal observations.

Additionally, this study relied on the multiple case study research design which generated data to dissect and understand teachers' experiences of using digital technology as a tool to support reading development. Crowe et al. (2011, p.1) explain that case study is "a research approach that is used to generate an in-depth, multi-faceted understanding of a complex issue in its real-life context". In this study, I explored multiple situations and understood diverse perspectives by utilising different data generation methods (semi-structured interviews and informal observations) to gain rich and in-depth knowledge of teachers' experiences of using digital technology to support children's learning in the Grade 1 reading contexts.

1.11 ETHICAL CONSIDERATIONS

Research involving human participants requires that harm or risks be minimised, human dignity is respected, privacy is considered, and autonomy is prioritised (Yin, 2014). The ethical principles of the University of the Witwatersrand Human Research Ethics Committee (non-medical) were adhered to throughout the course of this study.

Accordingly, participants were invited to engage in this study on a voluntary basis. Consent forms which included details of the study, were disseminated to all selected participants. Their signed informed consent was obtained and stored after they had understood and accepted the terms of engagement, including permission for all audio-recordings of the relevant research processes. The participants were informed of their rights to privacy, confidentiality, and anonymity – pseudonyms/codes were assigned to protect identities and information elicited from the participants. All field notes from observations were scanned and stored in a password protected e-file on my personal laptop which could only be accessed by myself and my supervisor. On completion of the study, the data collected will be stored for five (5) years in a digital form, with all identifying features removed.

Further, the participants were assured of being at minimal risk psychologically and/or physically; this meant that the likelihood of harm was none greater than that they would experience in their normal, everyday life. The participants were informed that they could withdraw from the study at any time without being penalised in any way. Lastly, they would be allowed to read the research report for verification before it was published, thus allowing the research to be validated.

1.12 TRUSTWORTHINESS

The qualitative criteria of this study looked at the trustworthiness of the research; this relates to four criteria "credibility, transferability, dependability, and confirmability" (Stahl & King, 2020, p. 26). Qualitative research demands high levels of reliability and trustworthiness that give the research process credibility (Yin, 2011).

Credibility questions the congruence of the findings with reality which is analogous with questions of internal validity (Stahl & King, 2020). There needs to be a relationship with the principles of credibility through various processes of triangulation whereby several sources are used to "repeatedly establish identifiable patterns" (Stahl & King, 2020, p. 26).

Transferability refers to the patterns and descriptions which can be applicable in different contexts. As important as it was for this research to create new knowledge, it was also

important to seek understanding from the systematic inquiry of others in the field (Stahl & King, 2020). As such, a rich description of circumstances was portrayed in order for transferability to apply.

Dependability refers to an in-depth description of the study's procedures and analysis of data to allow for replication (Stahl & King, 2020). Thus, dependability is ensured through well-documented, rigorous data generation procedures, and analysis.

Confirmability is the last criterion of trustworthiness which refers to getting as close as possible to the objective reality in qualitative research. This means proving that the research is not influenced by the researcher's assumptions and bias; instead, it should neutral. Thus, trustworthy research needs to produce findings which are objective and reflect authentic and verifiable information collected from participants.

In this study, credibility, transferability, dependability, and confirmability were achieved by structuring the questions of the semi-structured interview in a clear and simple way for participants to fully understand, while ensuring that all questions were relevant, unambiguous, sensitive, and unintimidating. This was reviewed by my supervisor, as well as research peers to ensure trustworthiness of the collected data and all procedures involved in conducting the study.

1.13 DELIMITATIONS

The limitations of this study were acknowledged; this increases the trustworthiness of the study. The first limitation was the adoption of the qualitative research process. There are many ways it can be seen as limiting including smaller sample sizes, the subjective nature of the research, the extensive time and resources required for data generation, and the lack of quantifiability as a standard measure (Busetto et al., 2020; Byrne, 2022; Creswell & Creswell, 2018).

The second limitation was that this study was conducted within private schools which meant that the findings could not be applicable to all South African schools, as the resources within these selected schools were more than what could be found in the majority public schools.

The third limitation was that the sample size of this study consisted of four participants; this was a very limited number of participants. As a result, this study was very small-scale in nature such that making strong claims in line with the results of the study was difficult. This is because the findings cannot be extrapolated because of the size of the sample and the

research context itself. Although complete transferability and extrapolation of the findings are preferable, for this study I wanted to rather generate an understanding of teachers' experiences of using digital technology to support reading development in Grade 1 classrooms.

The fourth limitation was that with qualitative research comes with researcher bias. As a researcher, I acknowledge my own bias. To circumvent this bias in my study, I made visible the research processes including the methodological approach, research paradigm, sample choice, participant selection, data generation methods, member-checking, and data analysis procedures. This assisted in ensuring that researcher bias was avoided. However, in any research it is impossible to be free of all bias as humans are not perfect.

1.14 ORGANISATION OF THE STUDY

Chapter 1- Orientation

This chapter presented the introduction, background, rationale for the study, research aim and objectives, and research questions. It also included was a brief literature review, an overview of the theoretical framework and methodology, ethical considerations, trustworthiness, and layout of the study. Lastly, a summary formed the conclusion to the chapter.

Chapter 2 - Literature Review

A review of literature was provided in this chapter. It was intended to familiarise the reader with the contents of the study in line with the aim, objectives, and research questions. This review of literature regarding the phenomenon under investigation involved both international and South African contexts. The chapter also described the theoretical framework which underpinned this study.

Chapter 3 - Methodology

The research methodology and selected research design were discussed. This chapter also provided a description of the data collection strategies used and the analysis techniques employed, while addressing trustworthiness and ethical considerations relevant to the empirical nature of the study.

Chapter 4 – Teachers' Conceptualisations and Efficacy with Technology for Reading

In this chapter, the data collected from semi-structured interviews and observations were presented, analysed, and the findings discussed. All these pointed to answering the research question: *What are teachers' perceptions and experiences of using digital technology to support reading development in Grade 1 learning contexts?*

Chapter 5 - Challenges in Using Digital Technology to Support Reading Development

This chapter answered the research question: *What challenges do teachers' experience when using digital technology to support reading development in Grade 1 learning contexts?*

Chapter 6 – Reflections, Limitations, Recommendations, and Future research

This final chapter completes the study by summarising the key findings from literature and the empirical data. Research conclusions emanated from answering the research questions. It reflects on the study's processes, its limitations, implications for education, and recommends possibilities for future research within the discipline.

1.15 CONCLUSION

This introduction provided the background and rationale for the study. It also outlined the problem statement, research questions and an overview of the literature study. The theoretical framework underpinning this study and methodology used to undertake the study was briefly described and ethical considerations, trustworthiness and limitations of the study were explained. Lastly, it presented the layout of the chapters.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The first chapter (1) provided an introduction to the research study. This chapter (2) discusses the literature review pertaining to teachers' experiences of using digital technology to support reading development. This focuses on understanding teachers' perceptions and use of digital technology in classrooms. This chapter also deals with the South African reading context which justified the undertaking of this study. Moreover, it compares the advantages and disadvantages of digital technology as a teaching and learning tool to enhance reading proficiency. Additionally, it presents teachers' perceptions regarding using digital technology as a tool to support reading development from a global and South African perspective. Further, the factors that influence the successful implementation of digital technology in classrooms are outlined. Since my study examined teachers' perceptions of using digital technology to support reading development, the epistemological orientations of the TPACK model developed by Mishra and Koehler (2006) were elaborated on. The chapter concludes by reflecting on the inferences of the review of literature specific to this study, as well as the theoretical framework which underpins it.

2.2 THE SOUTH AFRICAN READING CONTEXT

2.2.1 SA's Reading Crisis

Alarmingly, the PIRLS and ANA results (Howie et al., 2017; Mullis et al., 2023) exposed South Africa as having a reading crisis which has been of major concern for several years. This has been attributed to a multitude of factors: lack of resources, overcrowded classrooms, inadequate teacher-training, insufficient knowledge of reading instruction, a shortage of books in schools, and the language barrier (Dagada, 2022; Govender & Hugo, 2020; Liman Kaban & Karadeniz, 2021; Spaull & Pretorius, 2019). Regarding the language barrier, this is exacerbated by the fact that learners' different home languages interfere with processes regarding their acquisition of reading skills as most learners follow the school's LoLT [Language of Learning and Teaching] (Govender & Hugo, 2020). This challenge, among others, is why South African literacy levels are shockingly sub-standard. This is supported by the 2016 PIRLS study which revealed that "around 78% of South African Grade 4 learners do not reach the international benchmarks and therefore do not have basic reading skills by the end of the Grade 4 school year" (Howie et al., 2017, p. 11). Spaull and Pretorius (2019, p.

145 & 164) add that “three-quarters of South African Grade 4 children still could not read in any meaningful way in any language”. Gustafsson and Taylor (2022) assert that whilst this is true, children’s reading levels have improved over the last decade. However, I contend that these improvements have not been sufficient, given the astoundingly low 2021 PIRLS results which revealed a 3% dip in the results of 2016 (Mullis et al., 2023). These results revealed that only 19% of Grade 4 learners are able to read-for-meaning. This decrease means that SA has lost a decade of progress in reading comprehension, and is retrogressing to the levels achieved in 2011 (Mullis et al., 2012). It is important to note that the above results were achieved post-COVID-19.

2.2.2 COVID-19 Crisis

It was confirmed that the COVID-19 pandemic negatively affected learning; SA’s catastrophic 2021 PIRLS results showed that that the decline in results from 2016 to 2021 had been the largest we have ever experienced (Mullis et al., 2023). Generations impacted by the COVID-19 pandemic in their early schooling were affected the most. At present, we cannot see the long-term effects of COVID-19 on reading proficiency due to the limited contact during the pandemic days of school closures, online classes with limited resources for both learners and teachers, and rotational timetabling - all of which curbed the spread of the virus (Ardington, Wills, & Kotze, 2021). However, there is further evidence to date that indicate that the quality of education in SA has decreased due to learning barriers (other than the pandemic) which affected socio-emotional and cognitive development (Gustafsson & Deliwe, 2020). Educational quality, according to Gustafsson and Deliwe (2020, p. 1), refers to the “basic competencies of learners in the schooling system” which is critical when looking at the future of education in South Africa since these competencies form the foundation for all education processes, and are thus considered as strong predictors for individuals’ opportunities to succeed in life. It is necessary to understand that prior to the pandemic, South Africa’s quality of education was steadily improving which provided a glimmer of hope for the future, given South Africa’s oppressive past which was riddled with “inequality, poverty and unemployment” (Gustafsson & Deliwe, 2020, p.1). However, the 2021 PIRLS study undertaken after the outbreak of the pandemic saw SA retrogress by decades of learning. It is estimated that it will take over three decades for SA to get to a state of steady improvement (Mullis et al., 2023). The impact of the COVID-19 pandemic on SA and developing countries is a barrier to future educational progress. Ardington et al. (2021) estimate by that between 62% and 81% of learning loss occurred in one year during the

pandemic, which suggests that the pandemic worsened an already prevalent problem. In sum, the long-term consequences of the pandemic (and recurring cycles of poverty) are set to haunt us for decades.

2.2.3 Teachers' Challenges When Teaching Reading

The COVID-19 pandemic's disastrous effects on teaching-learning, in addition to previous underlying problems of the past, exacerbated the situation of poor literacy in SA. Spaull and Pretorius (2019) explain that it is not possible to teach learners to read beyond a specific level without a basic set of books for literacy. Importantly, teachers need to possess, at the very least, a basic knowledge of how young learners learn to read, and how to teach reading effectively. Lamentably, the majority of South African teachers do not have this all-important skill to teach reading; this means they do not understand the components of reading, thus learners struggle to grasp reading skills to interpret texts (Spaull & Pretorius, 2019). Additionally, many South African teachers' "own lack of proficiency in English – which is usually their second language" complicates the situation (Spaull & Pretorius, 2019, p. 157). Hence, they cannot teach reading effectively. It is normal that in the Foundation Phase (FP) the 'traditional teaching' method is preferred for "learners work in a way suggested to them by their teachers, use the materials provided to them, and rely on the knowledge that their teachers possess" in order for them to develop critical skills in reading (Dagada, 2022, p. 1). As FP learners solely rely on the teacher to develop their reading skills, teachers need to have a bank of knowledge to enrich reading instruction by employing various reading strategies (Dagada, 2022). Dagada (2022, p. 3) asserts that many teachers in SA "teach reading using limited strategies such as the alphabet and bottom-up reading techniques; for example, using phonics". Even though teachers were using these limited strategies they were still "failing to teach reading with understanding, and they did not understand the detail of how to develop learners' reading abilities" (Dagada, 2022, p. 3). This issue can be traced to the initial teacher-education training which has proved to be inadequate as teachers need to be thoroughly equipped with knowledge, skills, and competencies to effectively teach reading by applying a variety of strategies. Dagada (2022) adds that teachers are overwhelmed by their inability to effectively teach reading, and this is exacerbated by overcrowded classrooms, lack of resources, limited support from school management teams (SMTs) and parents, and the intricacies of multilingualism, amongst others.

2.2.4 Digital Technology in Schools: Coding and Robotics

The DBE (2021) introduced digital and technological initiatives which included coding and robotics into the CAPS curriculum from 2023. This subject aims to 'future-proof' learners by preparing them for the changing world precipitated by 4IR. Kalolo (2019) asserts that within developing countries, there is a trajectory towards a technological model of schooling which aims to transform many (if not all) educational systems' processes. The CAPS' inclusion of the subject of robotics and coding intended to include young South Africans to migrate to digital technology in line with the rest of the world (DBE, 2021). The question arises: are there inadequately trained teachers to be able to do justice to teaching this subject (Geldenhuys & Fataar, 2021). I observed that some teachers are barely able to cope with the current curriculum delivery amid the unfavourable teaching conditions at some schools. Now the situation has become unmanageable as teachers are required to teach coding and robotics which is a subject they have never previously taught or were trained to teach. This is aggravated by some schools not having the basic infrastructure and rudimentary resources such as computers, tablets, and other digital devices.

Further, Kalolo (2019*)* views coding and robotics as a subject that advantages a developing country like SA to reinvent itself to overcome prevalent digital-related challenges. The world is fast evolving; hence, education needs to adapt to this digital era. Accordingly, the CAPS addition of robotics and coding as a subject is a way of transitioning to meet global trends (DBE, 2021). While this subject prepares learners for the ever-changing technological world and the international job-market by providing them with the ICT and digital skills necessary for the future, the past and present problems persist; for instance, 81% of South African Grade 4 learners are unable to read-for-meaning (Mullis et al., 2023). At present, there is limited research on the implementation of coding and robotics as a subject in SA schools. Geldenhuys and Fataar (2021, p. 8) found that some teachers who already introduced coding and robotics into their teaching in primary schools displayed "the lack of awareness of computational thinking skills and a reflection on the precursor skills". This has implications for the pedagogy of reading which are directly related to the acquisition of literacy. Consequently, the teaching of reading is largely ineffective, and this hinders the transference of specific skills needed for coding and robotics.

In this regard, teachers need training (in- and pre-service) and more time to implement coding effectively. My research was done prior to the 2023 inclusion of coding and robotics as a subject in the CAPS curriculum (DBE, 2021). Presently, there is the belief that due to this

inclusion, teachers will be adequately trained and sufficient time will be allocated to the subject. Although this is laudable, South African learners are still unable to read-for-meaning. The question now arises: how can we use digital technology to improve reading proficiency? This is where my study is situated: what are teachers' experiences of using digital technology to support reading development in the South African Foundation Phase?

2.3 DIGITAL TECHNOLOGY: A TOOL TO SUPPORT READING DEVELOPMENT

In chapter 1, I briefly discussed how digital technology can be used as an educational tool. In this section I elaborate by explaining that technology has become an integral aspect of human life as it is fast becoming integrated into schooling and in the general educational sphere (Singh, 2021).

The concept of the digital classroom has emerged in SA, thus revolutionising teaching by intending to enhance it to meet international benchmarks. This improving of education and uplifting of learners' performance can be promoted through a knowledgeable teacher who has been schooled in technology skills, which suggests the need for the improvement of teacher education to uplift learner education (Singh, 2021). Raja and Nagasubramani (2018) confirm that digital technology in education allows for learning to be more interactive, interesting and the knowledge transfer process to become easier and more convenient. While this is acknowledged for its relevance, this study's focus was on the teachers' experiences of using digital technology to support the development of reading.

Baron (2017), Ciampa (2012) and Yelland (2018) who maintain that digital technology can be an effective tool to support reading development, suggest that the nature of reading is changing because reading habits of print texts are vastly different to digital or electronic reading which has multimodal features which can distract learners. However, this must not necessarily be looked at as a negative. Since digital texts often have more pictures, visuals, diagrams, graphs, video clips, and illustrations, it simply means that digital users are able to better multitask while reading. Moreover, digital technology simplifies the reader's understanding of electronic texts mainly because of the sub-tools available to dissect the meanings of difficult scripts (or words) which create a different mindset towards reading in general (Baron, 2017). This growth mindset is directly linked to evolving to meet 4IR standards which is embedded in digitalisation (Scepanovic, 2019). I agree with this notion as I have seen the great potential of digital technology in education. For this study, it meant that

reading development can be successfully and effectively supported by the use of digital technology as a tool to promote reading-for-meaning.

Research reveals that the role of technology in learning and teaching in the 21st century is fundamentally different to prior decades and thus requires a different pedagogical approach. As such, the theories of teaching and learning need to be adapted to reflect present technological realities to equip learners with 4IR skills. For example, a study conducted by Ciampa (2012) examined an international perspective of literacy learning specifically with iPads which revealed that learners were able to make-meaning faster and more effectively as using technology enabled them to exercise a degree of self-determination, this was supported by similar research by Yelland (2018). While it is acknowledged that digital technologies develop reading skills that enhance learners' learning experiences, their motivation to learn to read is also promoted (Baron, 2017; Ciampa, 2012; Kayalar, 2016).

Additionally, Biancarosa and Griffiths (2012, p. 139) confirm that digital technology can be an effective tool to support reading development as they note the different ways in which digital technology has already "been used to build the skills and knowledge needed both by children who are learning to read and by those who have progressed to reading to learn". This refers to the ways in which e-reading technology has been used to develop early reading skills which also assist learners with disabilities, visual impairment, and those who are not at grade-appropriate level. Also, digital technology provides teachers and researchers with tools to support apps regarding reading to learn (Biancarosa & Griffiths, 2012; Wolf & Potter, 2018). Biancarosa and Griffiths (2012) add that since technological support has been used in classrooms, reading development has advanced tenfold. Similarly, a study by Burnett et al. (2006) which validates the positive influence of digital technology on literacy development (including reading), noted that the use of digital technology in classrooms differs significantly in its use outside of the classroom. This was recognised in a similar manner by Wolf and Potter (2018) who recognise the reading brain in the digital world and see that the use of digital technology to differ within different contexts and among its different uses: home, school and work As such, its use within the classroom for fostering reading proficiency needs to be tailored to the individualistic needs of learners in their classrooms. In their study regarding the use of various digital texts, it was found that learners "responded with keen interest to the challenge of working onscreen, thus demonstrating a willingness to experiment and learn, as well as a fairly sophisticated awareness of the ways in which meaning can be created with interactive multimodal texts" (Burnett et al., 2006, p. 26).

Learners demonstrated through the utilisation of technology that they could understand a range of texts to use them meaningfully such that they were able to grow in confidence to enhance their reading skills.

2.3.1. Affordances of Digital Technology as a Tool to Support Reading Development

From a very young age children are introduced to digital technology, thus they show great interest and focus in using it. Knowing that they are oriented towards digital technology opens up a gateway for successful future learning. As such, educators, teachers, policymakers, and researchers need to see digital technology in a new light - one which enhances learners' development (Keengwe et al., 2009; Levy, 2009). The technological age has shown that digital devices are effective tools when harnessed correctly as they have great advantages to uplift reading levels (Bahari & Gholami, 2023). The technologically-based life emerging over the past decade has shown that digital technology is a phenomenal tool which, when utilised correctly, has great potential and advantages.

Additionally, the use of digital technology within the classroom greatly increases learners' interest and motivation concerning reading development (among others). Struggling readers and those who do not particularly enjoy reading are greatly motivated by using digital technology (Liman Kaban & Karadeniz, 2021). This is because learners who read digitally see technology as fun- filled and stimulating as opposed to picking up a traditional book and reading from it. The integration of technology into reading instruction can hone reading skills, and motivate learners to interact more with touch-based interface tools; for example, tablets, iPads, computers, and laptops (Neumann, 2018). In this way, learners are empowered to take charge of their own learning. Technological devices provide interactive e-books that have multimedia features such as animations and sound effects which learners enjoy to engage with, thus the reading experience is both interesting and educational (Yorganci, 2022).

Kayalar (2016) maintains that digital technology allows the teacher and learner to access background knowledge and other relevant information about the reading resources or texts to suit teaching-learning needs. This means also that when the learners are reading, their own background knowledge is being integrated through interactive cognitive processes that give meaning to texts. Since learners essentially read beyond the text, this allows them to further develop their understanding of the text being read in line with the realities of the world around them, which extends beyond the physical. Kovac and Van der Weel (2018) explain

that digital reading environments offer different ways of presenting information that is not possible to achieve with hardcopies which changes the way in which we read.

Within the classroom, digital technology provides individualised support, including scaffolding for struggling learners (Yorganci, 2022). This can be facilitated through digital tools such as text-to-speech and audiobooks. In addition to digital texts and materials which are presented to learners, technology can be adapted to suit learners' individual reading levels and skills (Kovac & Van der Weel, 2018). As such, the learning-to-read process becomes more flexible to cater for the particular needs of each individual learner in order to enhance the development of reading with understanding.

This embedded support system within reading apps and websites empowers the reader. For instance, the digital customisation options allow font size and style to be changed in a way which improves the quality of the text presented on the screen (Arifani & Rosyid, 2016). Although this is a simple process, it has a significant impact on some learners who experience visual challenges which are generally ignored when reading print-text. Further, some reading apps and websites have tools which allow learners to record their reading and play it back to pick up their errors, either by themselves or by the software (Yorganci, 2022). This assists learners to improve their reading skills individually and independently without having to interrupt their reading flow (Keengwe et al., 2009).

This independent learning and skills acquisition facility digitally allows learners to 'figure it out' without stopping to ask questions. Some apps and programmes have interactive user faces which allow learners to engage fruitfully with the text (Kovac & Van der Weel, 2018). When learners are encouraged to 'figure it out', their ability to comprehend the text meaningfully is significantly enhanced compared to when reading print-text. The accessibility of connecting and interacting with the text digitally allows learners to highlight, colour code, decode, and even annotate the text without causing damage to the e-book while reading (Levy, 2009). This provides learners with a sense of autonomy over their learning-to-read process such that they can detect areas for improvement by themselves which allows the teacher to assist with remedial work (Arifani & Rosyid, 2016).

Levy (2009) contends that learners' vocabulary and spelling skills improve through the use of digital technology. This is supported by Lieberman, Bates and Jiyeon (2009) who recognise that the improvement of such skills is directly related to improvement in reading. This is elaborated on by Beschorner and Hutchison (2013) who explain that the use of digital

technology not only enhances reading skills, but also speaking, listening, and writing skills. Moreover, Beschorner and Hutchison (2013), Levy (2009) and Lieberman et al. (2009) confirm that there is a connection between the improvement of language skills, reading, and digital technology. While Levy (2009) agrees that comprehension and critical analysis abilities are enhanced by the use of digital texts, Lieberman et al. (2009) recognise that digital technology can enhance letter-sound awareness and listening comprehension.

The use of digital technology has various benefits when it is used to support reading development. It is important to note that it needs to be used appropriately and effectively in order for learners to gain maximum benefit. In other words, teachers need to be cautious and selective when utilising digital technology to support reading development.

2.3.2. Constraints of Digital Technology as a Tool to Support Reading Development

Although there are many advantages in using digital technology to support reading development, it is not without constraints. There are disadvantages which have been recognised that extend beyond the development of reading skills.

Firstly, young children are full of energy and require tactile experiences which develop them holistically. Reading is considered to be a multi-sensory experience, thus using digital technology as a reading tool somewhat deprives them of the tactile experience of holding a book, turning the pages, and even smelling the book (Hu & Yu, 2021). This means learners who mainly read digitally are likely to become less creative and imaginative because they are limited in terms of face-to-face time with others (teachers and peers), as they spend more time by themselves when utilising digital tools. The shift from print to screen reading can also imply that learners approach reading in a different manner because when they are reading digitally their attention decreases during the reading process when compared to print-text (Hu & Yu, 2021).

Secondly, Segers et al. (2023) understand that the reading process via digital technology is less immersive which for a variety of reasons may lead to a superficial comprehension of texts when compared to print-texts. According to Segers et al. (2023), this is because in print texts, one's comprehension depends on what is physically depicted in the hardcopy which deepens comprehension through sense-making processes. In other words, when reading digitally, there are more immersive experiences and multimodal opportunities to explore that make comprehension to lack depth. This is, however, contrary to Levy's (2009) assumptions.

Further, reading requires undivided focus. However, multimodal and interactive digital books, reading software, and other apps provide a multitude of distractions. Ramírez-Peña et al. (2022) recognise that reading via a technological device which requires a mere touch of the finger can prove to be distracting. Since young children are easily distracted and often lack self-discipline to stay focused on a given task (e.g. online entertainment), the degree of sense-making of the on-screen text is erratic (Ramírez-Peña et al., 2022). In addition, the reader of a digital text is always multi-tasking while reading, whereas interacting with print text reduces distractions. Although this is worrying, Baron (2017) and Burnett et al. (2006) see multi-tasking as a cognitive developmental skill. However, the possibility of becoming easily distracted through the excessive use of digital technology when reading means requiring extra monitoring and constant guidance by teachers. Other aspects of a reader's life may also be affected; for example, concentration due to cognitive overload and postural considerations may affect the holistic wellbeing of a learner (Brüggemann et al., 2023). Simply put, young learners' motor development may be stunted if they develop cognitive and physical problems when digital technology is used irresponsibly and excessively.

It is evident that there are both advantages and disadvantages when using digital technology in general, and specifically as a tool to support reading development. Given the above information, it is still beneficial for digital technology to be utilised in the teaching and learning reading process, but sound management and training are necessary for both the teacher and the learner in order for digital technology to be used (with no risks) as a tool to effectively support reading development. Accordingly, there must be a balance between using digital technology as a reading support tool and using it irresponsibly as a 'babysitter' in classrooms. Hence, teachers must have an incisive understanding of what digital technology entails, and how it can be applicable to support reading development such that effective pedagogies (e.g. TPACK to design and integrate lessons) which support reading development can be exploited to enhance learners' academic performance (Kabakci Yurdakul et al., 2012).

2.3.3 Teacher Agency

Teacher agency regarding the use of digital technology integration into pedagogical practices has a clear view of pedagogical objectives and educational outcomes when using digital tools to improve learning experiences rather than replacing traditional teaching methods (Chai et al., 2011; Koehler et al., 2014; P. Mishra & Koehler, 2006). Continuous professional development supports the use of technology in the teaching process by providing teachers with skills and knowledge to use digital technology effectively in their teaching (Akram et

al., 2022). This includes training in digital literacy and pedagogical strategies, as well as critical assessment of digital tools (Abu-Hardan et al., 2019). Teachers with agency prioritise their learners needs and interests when choosing and implementing digital technology (Damşa et al., 2021). They use digital technology to promote learner engagement, creativity, critical-thinking, and collaboration. When teachers understand and foster the use of technology, they can continually refine their approach by reflecting on their pedagogical practices and adapting their use of digital technology according to feedback, learner performance and the ever-changing educational needs of their learners. Teachers with agency also advocate for the proper and effective use of digital technology in education as they take on leadership roles in their schools and communities by promoting digital literacy and integration. By fostering teacher agency in using digital technology, teachers can provide meaningful and engaging experiences for their learners.

The research done on teacher agency on the use of digital technology for teaching and learning emanates from the COVID-19 pandemic. I refer to Gudmundsdottir and Hathaway (2020) and Damşa et al. (2021) to explain and understand teacher agency with regards to the use of digital technology specifically during and post pandemic.

Gudmundsdottir and Hathaway (2020, p. 240) define teacher agency as "a construct that emphasises the capacity for doing the work of teaching given the resources and limitations of the working environment, as well as considers teachers' personal beliefs, values, and attributes". In this study, teacher agency refers to the teachers' use of their limited understanding, different perspectives, and limited training and support to use digital technology to attempt to support reading development in their Grade 1 learning context.

Research by Damşa et al. (2021, p. 1) revealed that "different expressions of teachers' agency, both ostensible and occlusive, were shaped by constraining circumstances" (i.e. the COVID-19 pandemic). However, they note that the findings from their study can be used to "inform future studies of online teaching, indicate the conditions for development of teachers' digital competence, and illustrate the challenges brought about by crises" (Damşa et al., 2021, p. 1). This means that their research forms part of the basis for the future of teacher agency on the use of digital technology in teaching and learning in a time of crisis, but also for the future digital world which is becoming the reality as per the 4IR (Damşa et al., 2021; G. B. Gudmundsdottir & Hathaway, 2020; Schwab, 2017).

Molla and Nolan (2020, p. 67) describe five facets of teacher agency: *inquisitive agency* which shows that "teachers with a strong sense of agency actively seek learning opportunities", *deliberative agency* where teachers "think [deeply] about their beliefs and practices", *recognitive agency* wherein teachers "demand to be valued and respected for their professional work", *responsive agency* where teachers "are committed to addressing educational disadvantages" and *moral agency* where teachers "act ethically and make morally justifiable decisions". Molla and Nolan (2020, p. 67) add that "professional learning experiences that problematise practice and context of practice are proposed as an instrument for building teacher agency". As such, these facets of teacher agency are evident in teachers in this study in different forms. This is because they lack training and support, and as a result exert their agency to utilise digital technology in whatever way they see fit and possible within their capacity.

Geldenhuys and Fataar (2021, p. 4) discovered that teachers of their own volition "attended educational technology workshops, courses, and conferences as part of their professional development" which further sparked teachers' interest in coding. They observed from these conferences the importance of young children learning coding. This can be applied to digital technology as a whole because coding in itself relies on and is derived from using digital technology in different forms.

2.4 TEACHERS' PERCEPTIONS OF DIGITAL TECHNOLOGY AS A READING SUPPORT TOOL

If applied astutely, digital technology can be an effective and efficient tool to support reading. Given that digital technology can be perceived as having a positive or negative influence within classrooms, the function of the teacher during reading lessons should include supervision, close monitoring, and appropriate assessing.

On the positive side, many teachers recognise digital technology as an effective tool to support reading development in all learners (Jannah et al., 2020; Spiteri & Chang Rundgren, 2020). Jannah et al. (2020, pp. 1-2) state that "digital technology has the potential to improve education for all students, and since students gain knowledge in different ways, offering different kinds of digital tools can contribute to making teaching more accessible", adding that the integration of digital technology into reading and writing lessons effectively develops learners' reading and writing skills.

Further, teachers who have a positive perception of digital technology as a reading support tool recognise and believe that interactive e-books, reading apps, and text-to-speech software enhance comprehension, engagement, and supplement skills being taught, while allowing learners to take charge of their learning and assisting those who are not learning at the same level (Ingram, 2020). Ingram (2020) elaborates that interactive e-books which can include animations, videos, and other multimedia features help to bring the story to life, thus keeping learners interested. Many reading apps and websites such as Reading Eggs and Purple Mash (employed by the teachers in this study), reading.com, readingrockets.com, Epic!, HOMER, EndlessReader and many more also provide personalised recommendations based on learners' reading levels and interests. These in turn help to encourage them to read more frequently to enjoy interacting with texts. Research conducted by Tweed (2013) on technology implementation in reading found that the age of the teacher, years of teaching experience, gender, qualifications, and time spent on professional technological development did not play a significant role in classrooms. However, this research did indicate that "the self-efficacy of teachers is significantly positively related to classroom technology use by teachers" (Tweed, 2013, p. 2).

Similarly, teachers who have a positive perception of digital technology as a reading support tool have recognised and believe that interactive e-books, reading apps, and text-to-speech software can enhance comprehension and engagement, they can also supplement skills being taught, allowing students to take charge of their learning and it can act as a support tool for those who are not learning at the same level (Ingram, 2020). As such, digital tools can provide a more engaging and interactive reading experience for learners. (Ingram, 2020) provides an example of interactive e-books which can include animations, videos, and other multimedia features which help to bring the story to life and keep learners interested. Many reading apps can also provide personalised recommendations based on students' reading levels and interests. This in turn helps to encourage them to read more frequently and enjoy the content which they are reading. Research done by Tweed (2013) on technology implementation found that the age of the teacher, their years of teaching experience, gender and time spent in professional technological development did not play a significant role in the implementation of digital technology in their classrooms. However, the research did indicate that "the self-efficacy of teachers is significantly positively related to classroom technology use by teachers" (Tweed, 2013, p. 2).

Varol (2013) sees this as the way in which teachers' confidence in using ICT is directly related to their perception of using it in classrooms. This means that those with a positive attitude towards ICT and confidence in its use have an overall better perception when using it as a reading support tool. Ata and Yıldırım (2019) also reached a similar conclusion in their study where they looked at the perceptions and views of digital literacy of 295 pre-service teachers. They understood that in the digital world young learners are faced with social networks, computer games, blogs, and even digital creation experiences during their education periods. "These multimedia and even interactive hypertext faced through digital technologies require study at an early age to acquire critical-thinking and advanced analysis skills" (Ata & Yıldırım, 2019, p. 88). Since teachers are the ones to provide these to them, there needs to be an increase in teachers' standards, perceptions, and understanding towards the use of digital technology. In other words, teachers need to have a positive perception of digital literacy, and should develop cognitive skills to effectively utilise digital technology as a reading support tool (Ata & Yıldırım, 2019).

Also, Madsen et al. (2018) recognised the importance of teachers developing positive perceptions in utilising digital technology as a reading support tool; however, some teachers have negative perceptions which hinder reading development. These teachers are concerned that digital technology may replace traditional print sources in the classroom, and may in turn replace them as teachers – in other words, they feel threatened that they may be replaced by technology (An et al., 2021). Hence, they try to keep digital technology out of their classroom spaces, but do not realise that their insecurities disadvantage learners (Chiu, 2023). An et al. (2021) add that the COVID-19 pandemic exposed this fear as teaching was conducted mainly through online platforms. While learning outcomes were much lower than during pre-pandemic years, it showed that learning during the pandemic was still occurring although teachers' influence was significantly less evident. Since teachers are concerned that traditional print resources are being replaced by digital technology in the classroom (Kayalar, 2016), there is the urgent necessity to re-train them to become au fait and confident with modern trends (ICT). In addition, there is the fear that the learners will become far too reliant and 'addicted' to digital tools. As a result, they will not develop at the same level to attain high levels of reading comprehension and critical-thinking skills than they would have if they were reading traditional print materials (Chiu, 2023). To exacerbate the situation, there are teachers who feel that learners who struggle with reading may find using digital tools less

effective as they may become overwhelmed by multimedia sources and large amounts of information presented on the screen (Kayalar, 2016).

Generally, teachers' perceptions of using digital technology as tools to support reading development are mixed, but lean more towards the positive than the negative. While many teachers believe that digital tools can enhance comprehension and engagement, others are concerned about their potential drawbacks. Ideally, it is important to use digital tools in conjunction with traditional print resources for a balanced approach to reading instruction. While it is essential to note that teachers' perceptions are influenced by different factors within their own lives which affect their abilities, skills and confidence, their perception of digital technology as a reading support tool can be changed if the barriers which hinder its implementation are adequately and expeditiously addressed.

2.5 FACTORS AFFECTING THE IMPLEMENTATION OF DIGITAL TECHNOLOGY IN CLASSROOMS

In order to achieve an effective and efficient change in the school environment, it is necessary to identify the factors that can encourage migration to digitalisation. It is acknowledged by Spiteri and Chang Rundgren (2020), Blackwell, Lauricella and Wartella (2014), Prodani, Çobani, Bushati and Andersons (2020) and Buckenmeyer (2010) that there are barriers stifling the effective implementation of digital technology in classrooms. By perusing these authors' works, there is a commonality in challenges affecting digitalisation.

The main barrier is poor infrastructure in schools which refers to the limitations of the school itself in terms of technology, but this challenge extends beyond SA. Not all classrooms have Wi-Fi, access to the internet, electricity, and in most rural schools there is the lack of tables and chairs (Bornman, 2016; Dagada, 2022; Lai & Widmar, 2021). Hence, the introduction of digital technology into lessons in such classrooms is possibly a pipedream. Due to the poor infrastructure of the school, even when digital technology resources are available, they may be of no use to the teachers or learners (Blackwell et al., 2014; Spiteri & Chang Rundgren, 2020). Additionally, if the school does have access, there is a limited availability of the digital resources; that is, it is limited and has to be shared within the school. This is then allocated by the school as they see fit; as such, many teachers never have the opportunity to use these resources in their classrooms (Prodani et al., 2020). This situation is exacerbated by continual loadshedding in SA.

Additionally, when digital technology resources are available, they are insufficient for all the learners in the class or they are broken, or do not function properly. Moreover, the teacher's perception of digital technology influences its implementation in the classroom which may result in its success or failure. This is confirmed by Spiteri and Chang Rundgren (2020, p. 114) who state that the knowledge, attitudes, and skills of the teacher are "influenced by the school culture". Buckenmeyer (2010) elaborates that the use of technology needs to be supported by the school community in terms of availability and effective implementation. Moreover, it is imperative to professionally develop teachers by training them on the use of different types of digital technologies in the classroom to enhance teaching and learning. This may hasten teachers to develop a positive attitude towards digital technology which may lead to its effective implementation within their classrooms. Judging from my own experiences and observations at different schools, using digital technology to support reading development is effective when on-site training is conducted which leads to the changing of negative mindsets.

Further, Blackwell et al. (2014) conducted research to specifically investigate the factors that influence the use of digital technology in early childhood education, specifically in the Grade 1 learning context. They indicated six factors which positively influence the effective implementation of digital technology in classrooms. First, teachers with a higher level of support from their school are more confident, have a positive attitude, and use technology more extensively than those with a lower level of school support (Blackwell et al., 2014). This is supported by Prodani et al. (2020, p. 1458) who conducted similar research and found that "digitally supportive schools tend to encourage teachers to use computers more" which in turn creates a positive attitude towards digital technology use as a whole. Second, teachers' attitudes, confidence and technology use are positively correlated to schools with technology policies (Blackwell et al., 2014). The third which was relevant to my study, but surprising, referred to learners from lower socioeconomic backgrounds who have a more positive attitude towards the use of digital technology, and used it more frequently compared to those from a higher socioeconomic background (Blackwell et al., 2014). This was understandable as the technology tools may only be available to them at school, in addition to such devices being novel, fun, and interesting. On the other hand, learners from a higher socioeconomic background may have access to technology at home all the time, and perhaps find it boring or are disinterested due to its overuse. However, Prodani et al. (2020) differ by stating that

irrespective of learners' socioeconomic backgrounds, those learners who are in a digitally supported school have more computer knowledge, and therefore use technology more often.

The fourth impediment was that teachers with more teaching experience may use technology in their class, but they have a negative attitude towards it compared to teachers who have fewer years of teaching experience (Blackwell et al., 2014). This implies that the more experienced or older teachers need to be trained intensively in the use of technology. In contrast, research by Tweed (2013) found that both the age and years of teaching experience did not impact teachers' use of digital technology in the classroom.

The fifth and sixth factors are directly related to teachers' confidence, and having a positive attitude. Blackwell et al. (2014, p. 84) recognise that teacher-confidence in the use of digital technology in "developmentally appropriate ways has a positive influence on technology use and mediates the relationship between support and technology policy on technology use". This means that for teachers to successfully digitally support learners, there needs to be an effective school policy supporting technology use, in addition to having confident teachers who are excited to utilise and incorporate technology into their teaching (Prodani et al., 2020). Lastly, an enlightened teacher-attitude towards technology as being a valuable tool for teaching and learning positively influences its use in the classroom. Consequently, its value is understood by learners from different socioeconomic backgrounds, and on all teachers irrespective of experience.

In sum, there are many factors which negatively influence the effective implementation of digital technology in classrooms. However, it has also been revealed that there are many positives influencing its implementation. The solutions include teacher-(re)training, developing teacher-confidence, and displaying a positive attitude towards the implementation of digital technology in classrooms. Also, sufficient and unrestricted access to technology resources which should be in good working condition is a necessity. The above information guided me in this study to access knowledge on teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts.

2.6 THEORETICAL FRAMEWORK

A theoretical framework is the foundation where knowledge for a research study is metaphorically and literally relied upon. It is a system of concepts, conventions, theories, principles and expectations which serve as the structure and support for the study (Grant & Osanloo, 2014). The theoretical framework that underpinned this study was the TPACK

model developed by Mishra and Koehler (2006). This model helps teachers with technology integration in teaching practices. It was chosen because this study focuses on teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts.

In this regard, Mishra and Koehler (2006) have reformulated and adapted Shulman's principles of Pedagogical Content Knowledge (PCK) to suit the ever-evolving world of technology, specifically in terms of teaching and learning (Gudmundsdottir & Shulman, 1987; Shulman, 2015). As such, they created the Technological Pedagogical and Content Knowledge (TPACK) model. The centre of this model is the content, pedagogy and technology which are the primary components of teaching and learning through technology.

As explained in chapter 1, the following concepts were of relevance to my study: TK, PK, CK, PCK, TCK, TPK and most importantly the combination engendered through commonalities - TPACK. To reiterate, TK "refers to teacher knowledge about traditional and new technologies that can be integrated into curriculum" and the teachers ability to both use and understand technology (Koehler et al., 2014, p. 102). This study determined whether teachers were using digital technologies appropriately to support reading development, and whether they were comfortable and confident in doing so.

Pedagogical knowledge (PK) refers to "teacher knowledge about a variety of instructional practices, strategies, and methods to promote students' learning" (Koehler et al., 2014, p. 102). This includes an understanding how skills are acquired and how knowledge is constructed. It is the knowledge and understanding of the practices and procedures of learning and teaching. This includes an understanding of the way in which skills are acquired and knowledge is constructed (Mishra & Koehler, 2006). In the context of this study, PK refers to the ability of the teacher to understand learners' needs and use digital technology to support learners to reach their maximum potential.

Content knowledge (CK) which "refers to any subject-matter knowledge that a teacher is responsible for teaching" which it includes conceptual, factual, theoretical and procedural knowledge (Koehler et al., 2014, p. 102). The content knowledge in this study refers to the curriculum, specifically reading and its requirements.

These foundational components include PCK, TCK and TPK which form TPACK. The PCK, according to Mishra and Koehler (2006, p. 1021), is pedagogical content knowledge which is based on Shulman's (1987) notion of the "blending of content and pedagogy into an

understanding of how particular aspects of subject matter are organised, adapted, and represented for instruction". Also, PCK requires the knowledge and understanding of the different teaching elements, how they can be used and adapted to the content, and how the content can be organised to advance teaching methods. In this study, PCK refers to the teachers' ability to know what to teach, and how to best teach their learners.

Technological content knowledge (TCK) "refers to knowledge of the reciprocal relationship between technology and content. Disciplinary knowledge is often defined and constrained by technologies and their representational and functional capabilities" (Koehler et al., 2014, p. 102). The interdependent relationship between technology and content means knowing how subject matter can, and is influenced by the application of digital technology (Chai et al., 2011). In other words, TCK in this study refers to the teacher's ability to understand and explain how digital technology can support reading development in Grade 1 learning contexts. Hence, TCK is technological content knowledge which "refers to an understanding of technology that can constrain and afford specific pedagogical practices" (Koehler et al., 2014, p. 102). As such, TCK in this study refers to the teacher's ability to understand and explain how digital technology can be used to support reading development in Grade 1 learning contexts.

The TPACK model is a framework which is the integrated end result of the combination of the above conceptual domains, specifically technology, content and pedagogy. Figure 2.1 below illustrates the TPACK model created by Mishra and Koehler (2006) which is foundational for the integration and use of technology for teaching reading skills. This model guides how the teachers use and interact with digital technology to deliver reading lessons to achieve specific and better learning outcomes (Roussinos & Jimoyiannis, 2019).

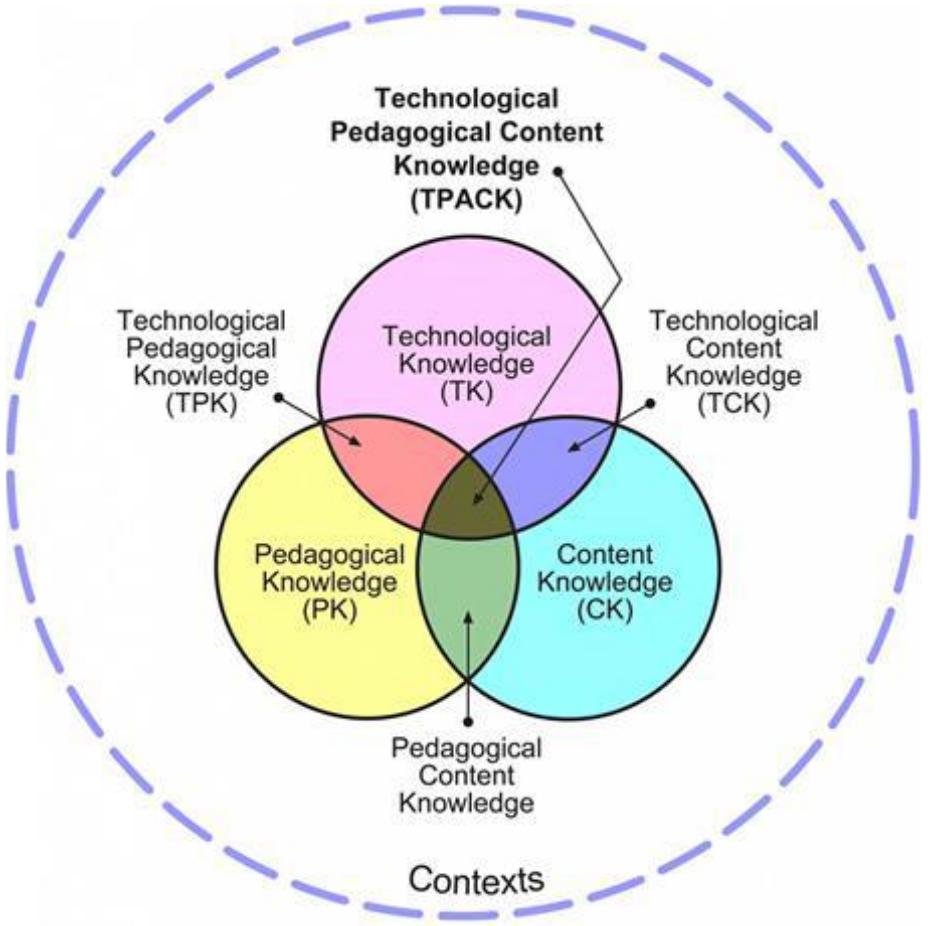


Figure 2.1: The TPACK model (Mishra & Koehler, 2006)

Mishra and Koehler (2006) believe that teaching is an intricate process which can only occur when a variety of knowledge fields are used, but when using digital technologies, it requires another knowledge field to be specifically included - the technological knowledge field. The TPACK model brings to light the 21st century educational problems faced by teachers (Chai et al., 2011). Thus, the model was chosen for this study as it is important for teachers to have a comprehensive understanding of the manner in which technological knowledge relates to content and pedagogical knowledge in order for effective learning and teaching to occur.

The TPACK model assists teachers in integrating digital technology into their teaching. This also benefits researchers, policymakers, and relevant role-players in determining the effectiveness of using digital technologies to promote reading proficiency (Abu-Hardan, Al-Jamal & Sa'Di, 2019; Archambault & Barnett, 2010). Chai et al. (2011) believe that teachers have inadequate training, and as a result are unable to integrate all the fields of knowledge within the TPACK model which led to problems in the implementation of digital technology in classroom.

Additionally, insufficient teacher-training led to the unsuccessful implementation of digital technology as a support tool in classrooms (Archambault & Barnett, 2010; Chai et al., 2011). Accordingly, this study explored the factors (besides insufficient teacher-training) that results in the unsuccessful implementation of digital technology as a support tool in classrooms. As such, this study explored the teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts. Hence, data was collected to determine whether teachers are adequately trained and prepared to use digital technology to support reading development, and if their training is reflected in their practice. I wanted to establish if teachers had sufficient knowledge, training, and skills in order to effectively use digital technologies in their Grade 1 classrooms to support learners' reading development. The TPACK model was used as the framework to construct the questions for the semi-structured interviews through which data was collected for analysis, allowing for the creation of themes and sub-themes which could then lead to data being easily interpreted. This model allowed me to expansively look at Grade 1 teachers' experiences of using digital technology in their classrooms to support reading development.

2.7 CONCLUSION

In this chapter, I reviewed literature which was relevant to the use of digital technology as a reading support tool, teachers' perceptions of technology, and factors which influence its effective implementation. This review of literature revealed that while digital technology is a phenomenal tool in education, its use and implementation in classrooms were not reflected as a beneficial teaching and learning tool. As such, there is a variety of impediments which need to be mitigated to maximally promote the use of digital technology as a support tool to enhance teaching and learning in the field of reading development. Also, the theoretical framework underpinning this study related to the TPACK model which was explained in this chapter. It revealed the importance of teachers, their knowledge, understanding, and personal and professional development. Importantly, the integration of technological, pedagogical, and content knowledge was described to clarify how technology can be beneficial in delivering reading lessons. The following chapter (3) discusses the methodological approach adopted for this study.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

The previous chapter (2) reviewed literature regarding using digital technology as a resource to support teaching, specifically for promoting reading proficiency. The literature focused on two key areas: teachers' experiences of using digital technology to support reading development, and their perceptions of implementing digital technology effectively. Overall, the literature review provided an outline of current research on using digital technology as a tool for early reading development. Additionally, it provided insight into the successes, conditions, and challenges teachers encounter when using digital tools for reading development.

This chapter (3) explains the methodological approach which is adopted in the study, it outlines the rationale behind the choices made, and the practical considerations for exploring teachers' experiences of using digital technology to support reading development in Grade 1 classrooms. The qualitative approach is explained, with specific attention to the case study design. The motivation for adopting a qualitative case study approach is outlined to make sense of teacher's experiences when using digital technology. Then follows a description of the research context, sampling strategy, and data generation methods. Moreover, it outlines the data analytical procedures used to derive meanings from the generated qualitative data. Reflexivity and how it shaped my outlook as a researcher are also included. Lastly, trustworthiness, ethical concerns, and limitations of the study are addressed.

3.2 RESEARCH PHILOSOPHY

A research philosophy is understood as set of beliefs which guide the structure, design and execution of a research study (Holden & Lynch, 2004). As such, different research philosophies offer diverse ways of understanding and interpreting research. In this study, interpretivism is the research philosophy employed. Interpretivism is grounded in hermeneutics which attempts to understand phenomena through the meanings that participants in a study assign to them. Additionally, Cohen et al. (2018) assert that interpretivism is categorised by a concern to understand the experiences of the human world. This research study aimed to understand teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts. The interpretivist paradigm was

chosen for this study as it facilitates in-depth insights from the data collected through semi-structured interviews and classroom observations.

Interpretivism as a research philosophy is "concerned with in-depth variables and factors related to a context" while considering "humans as different from physical phenomena as they create further depth in meanings with the assumption that human beings cannot be explored in a similar way to physical phenomena" (Alharahsheh & Pius, 2020, p. 41). Interpretivism aims to include the richness of insights gathered through the data; that is, it understands that within research, the subject of investigation is interlinked to participants' knowledge and cannot be divorced from it (Holden & Lynch, 2004). This paradigm suited my study as teaching is inherently a human experience - and this study aimed to understand teachers' personalised experiences and the meanings they attach to using digital technology for reading development.

Interpretivism as a research philosophy emphasises the importance of comprehending and understanding the meanings and experiences which individuals allocate to the world around them (Ryan, 2018). As a research philosophy, it focuses on exploring and understanding the human experience (behaviours), by aiming to encapsulate social phenomenon in the complex, rich and complicated manner it occurs (Ryan, 2018). As such, reality can be understood as something which is socially constructed, thus it varies between individuals, cultures, and regions. The interpretivist philosophy allowed me to collect in-depth data while understanding the context within which the data was collected, while noting the "individual meanings and contribution" of the participants (Alharahsheh & Pius, 2020). As a result, I was able to gain a good understanding of the teachers' experiences of using digital technology to support reading proficiency. This was possible as I interacted (without influencing), conversed and observed the teachers in their natural environments of teaching a reading lesson by using digital technology. As there are multiple realities, not simply one (Creswell, 2012), semi-structured interviews and observations brought me closer to the subjective experiences of teachers using digital technology to support reading development.

3.3 RESEARCH METHODOLOGY

This study utilised a qualitative approach as it aligned with the research paradigm to answer the research questions. Qualitative research facilitates deep insight into real-world problems by considering the experiences, behaviours and perceptions of its participants to help generate a hypothesis to investigate further (Creswell & Creswell, 2018). Additionally,

qualitative research methods are associated with the interpretivist philosophy (Cohen et al., 2018) which allowed for an in-depth exploration of teachers' experiences of using digital technology to support reading development which bridged the gap between the study's research philosophy, ontology, and aim.

Qualitative research explores social phenomenon by asking open-ended questions which cannot be easily quantified (Creswell, 2012). The aim was to explain and understand social experiences, behaviours, and attitudes as described by Grade 1 teachers at a specific moment in time (McMillan & Schumacher, 2010). The phenomenon included experiences, behaviours and attitudes, where the participants are allowed to explain their thinking, feelings, emotions and experiences at a certain time (McMillan & Schumacher, 2010). Qualitative data looks for themes and patterns to ensure that the context and narrative of the study are preserved that would otherwise be lost through quantification (Cohen et al., 2018).

I collected detailed evidence on how teachers in Grade 1 contexts used digital technology to support reading development. The data generation strategy focused on gathering detailed and rich data from Grade 1 teachers through semi-structured interviews and classroom observations. McMillan and Schumacher (2010) assert that qualitative research is important in the development of teaching practices and its improvement, thus a qualitative methodology was most appropriate for this study as the focus was on the teachers' experiences of using digital technology to support reading development.

Cresswell (2012) notes that semi-structured interviews and classroom observations allow for the generation of data from participants in their natural settings, thus allowing for a holistic understanding of teachers' ICT experiences. During the research process, the emerging themes were analysed to generate meaning and make-sense of how teachers use digital technology to support reading development in their classrooms (Spiteri & Chang Rundgren, 2020). In sum, the qualitative approach enabled an in-depth exploration and description of teachers' first-hand experiences in their natural settings.

3.4 RESEARCH DESIGN

Crowe et al. (2011) state that a research design is the plan or strategy which serves as a blueprint to guide the way research should be conducted. This is based on epistemology as explained by Haydam and Steenkamp (2020). To ensure the study was comprehensive in its execution, I created a plan beforehand. It was advised initially by Burton & Bartlett (2009) and then furthered guided by Shivashankar et al. (2021). While having a plan is important in

research it should not be inflexible as it should leave room for circumstantial changes. As a result, I allowed for changes in the research strategy within the sequence of planned events by working in tandem with the schools, including disseminating consent forms which needed to be read, signed and returned. The times of the interview and observations were negotiated to suit participants' convenience. As such, the research design and timeframes were modified throughout the research process.

To gain an in-depth understanding of teachers' experiences of using digital technology to support reading development, I used a multiple case study design which enabled the generation of rich, relevant information. Crowe et al. (2011, p. 1) explain a case study as an approach which "allows in-depth, multi-faceted explorations of complex issues in their real-life settings". Case studies involve investigations into specific phenomena that aim to understand the specific issues (Cohen et al., 2018). By analysing the data from multiple perspectives, I was able to develop a comprehensive understanding of the intricacies of the phenomenon being researched (Hancock et al., 2021; Yin, 2014).

Case studies are considered naturalistic as they do not manipulate or test participants. Instead, case studies provide the opportunity to gather descriptive, explanatory, and holistic data in a real-world context (Creswell, 2022). This study pursued a multiple case study design by utilising four cases to investigate teachers' experiences of using digital technology to support reading development in an organised and methodological way. A multiple case study design was appropriate as this qualitative research aimed to explore and interpret inductively the meaning within each teacher's experience. This design allowed me to compare and contrast subjective perspectives across cases to uncover deeper insights into Grade 1 teachers' experiences (Hancock et al., 2021).

Accordingly, I was able to create a holistic interpretation of the phenomenon being studied by highlighting the social, cultural, and individual dimensions involved in the teaching and learning processes. This aligned with the interpretivist paradigm of understanding experiences through Grade 1 teachers' unique experiences. Additionally, cross-case analysis revealed multi-faceted insights into how theories of teaching and learning manifest in real-life settings. Overall, the multiple case-study approach provided an in-depth understanding of the complexities involved when teachers use digital technology to support reading development.

Crowe et al. (2011) explain that the data generation process in a multiple case study requires flexibility to facilitate detailed descriptions of each case. This study used semi-structured interviews (with open-ended questions) and classroom observations to explore Grade 1 teachers' experiences of using digital technology. Thus, trustworthiness of the data process was enhanced as information was elicited from diverse sources across the four cases. According to Cohen et al. (2018), varying teacher-experiences and perspectives on the phenomenon under study is to be expected, even within similar teaching contexts. Thus, the multiple case study design enabled a nuanced analysis of the different ways in which teachers used digital technology in Grade 1 reading contexts. Rather than exploring common teacher-experiences, a multiple case study provided insight into the complexity and subjectivity of the phenomenon through teachers' personal experiences revealed across the four cases.

3.5. RESEARCH CONTEXT AND SAMPLE

The context of a research study provides crucial background information that sheds light on the research problem to answer the research questions. Merriam and Grenier (2019) explain that discussing the setting provides the reader with information about the where, who, and what of the study. This research was conducted at two private schools located near the centre of Johannesburg, SA. The schools follow an IEB curriculum and provide access to technology including Wi-Fi and personal devices for teachers and learners. The schools encourage teachers to use digital tools to enrich teaching and learning. Within this technology-rich context, I interviewed two Grade 1 teachers from each school, resulting in a total of four cases. This multiple case study design enabled a comparison of teachers' experiences of using technology for reading even within similar school contexts. Because the schools promote technological integration in teaching, examining variations in teachers' perspectives fostered the understanding of the dimensions shaping teachers' experiences. By using a multi-case approach, I was able to interpret how personal experiences and views diverge/converge despite common institutional environments and resources.

The sample was purposively selected to enable an in-depth understanding of teachers' experiences of using technology to support reading development in Grade 1 classrooms. Suri (2011) explains that purposive sampling involves defining sample characteristics in line with the aim of the study. Andrade (2021, p. 86) explains a purposive sample as "one whose characteristics are defined for a purpose that is relevant to the study". Grade 1 learning contexts were purposively selected as it marks the beginning of formal reading instruction in SA, and in many international schooling systems.

The two private Johannesburg schools (research sites) were selected through criterion sampling detailed in 3.5.1 below and convenience sampling. Palinkas et al. (2015) sees criterion sampling as cases that meet some predetermined criterion of importance. These two private schools met the criteria of access to technology and technology integration in teaching and learning. Andrade (2021, p. 86) explains a convenience sample as "one that is drawn from a source that is conveniently accessible to the researcher". In this study, the selected schools were close to my domicile and thus easily accessible. I also developed a good relationship with both schools, thus gaining easy access to them - a form of convenience sampling (Emerson, 2021).

3.5.1 Sampling to Select School Sites and Teacher-participants

Criterion sampling was applied to select schools and teachers which aligned with the research aim, objectives, and questions. The criteria for selecting schools to participate in the study were as follows:

1. Located in Johannesburg, Gauteng;
2. Extensive access to various forms of digital technology;
3. Adequate infrastructure and resources to support technology use; and
4. Specific timeframes for using technology in classes.

The teachers in the selected sites were also chosen through criterion sampling. Only Grade 1 teachers meeting the following criteria were included as part of the sample (Turner, 2020):

1. Qualified with a Bachelor of Education in Foundation Phase or Early Childhood Development (or similar);
2. Currently teaching in a Grade 1 classroom;
3. Already using digital technology in classroom teaching;
4. Have access to diverse digital technologies; and
5. Teach in classrooms where resources are readily available for all learners.

To ensure anonymity and confidentiality of the research site and the Grade 1 teachers, I allocated pseudonyms to participants and research sites. The codes/pseudonyms that applied to participants in presenting the research findings are listed in Table 3.1 below. I consulted with the teachers and came to an agreement that the following pseudonyms would be assigned:

Table 3.1: Participants' Pseudonyms

Participants	Teacher Pseudonyms
Participant 1	Alex
Participant 2	Mpho
Participant 3	Darcy
Participant 4	Kim

3.6 METHODS OF DATA GENERATION

The data used in this study was generated through the use of semi-structured interviews with four Grade 1 teachers, and through informal observations of these teachers while they were using digital technology to teach reading.

3.6.1 Semi-structured Interviews

DeJonckheere and Vaughn (2019, p.1) explain semi-structured interviews as a method which "consists of a dialogue between researcher and participant, guided by a flexible interview protocol and supplemented by follow-up questions, probes and comments". Semi-structured interviews allow the researcher to collect open-ended data which explores the thoughts, feelings, and beliefs of the participant about a particular issue or phenomenon which can include personal and sensitive issues. In this study, one semi-structured interview was conducted with each of the participants. The participants were asked prior the interview if they were comfortable with audio-recording the semi-structured interviews; all felt comfortable and gave consent prior to the interview. The four semi-structured interviews were audio-recorded and then transcribed (Appendix D).

The interview questions were designed based on the conceptual framework of the TPACK model (Mishra & Koehler, 2006) to elicit data that would answer the research questions. The TPACK model assisted in shedding light on the intersection between teachers' technological, pedagogical, and content knowledge. To ensure that the interview questions were relevant to elicit answers to fill the research gap, I identified key aspects from literature to structure them. Attention was paid to designing questions that would provide insights into teachers' knowledge, experiences, and approaches for early reading instruction. For example, the question *what formal or informal training have you received in digital technologies* was included because literature revealed that a lack of training in using digital technology directly affected its implementation in the classroom. I also reviewed my previous experiences with

teachers (while teaching) concerning them using digital technology which assisted in my creating relevant interview questions. The question *what support do you receive from stakeholders when using digital technology as a tool for reading development* was chosen as I recalled complaints from teachers about the lack of support when using digital technology and how it impacted their classrooms reading lessons.

To avoid anomalies, the semi-structured interview was piloted with a group of peers and teachers prior to data collection. This process allowed for testing and refining the interview questions to ensure relevance, clarity, and cultural sensitivity. Kallio et al. (2016, p. 2954) explain that the development of a rigorous semi-structured interview schedule "contributes to the objectivity and trustworthiness of studies, and makes the results more plausible". The final semi-structured interview schedule (Appendix A) was the result of an iterative process of collaboration, feedback, and revision of questions.

Semi-structured interviews were conducted at the selected schools during teachers' free time and after school hours to avoid interfering with instructional time. Interviews lasted between 30 and 60 minutes based on teachers' availability. Prior to the interview, dates and times for the scheduled interviews were negotiated. The open-ended interview schedule allowed participants to freely and uninhibitedly engage and share their experiences of using digital technology to support reading development. The flexible nature of the open-ended questions also allowed for the participants to make comments which prompted other spontaneous questions during some interviews (Schensul et al., 1999). The interview schedule covered four broad categories: biography, teachers' understandings of how digital technology can be used to support reading, using digital technology in the classroom, challenges and opportunities (Appendix A).

In sum, the semi-structured interviews provided rich, descriptive data by enabling participants to explore their thoughts, feelings, and beliefs regarding technology integration for early grade reading development.

3.6.2 Conducting the Semi-structured Interview

In conducting the semi-structured interviews, I followed a routine of cordiality prior to the interview to make teachers feel at ease. I first met the headmistresses and/or deputy headmistresses at both schools, and then proceeded to interact with teachers who were informed about my visit and purpose of my visit. After I introduced myself I then gave them the opportunity to introduce themselves after which we had informal chats about my research

and education in general prior to the semi-structured interview. I then discussed the purpose, format, and process of the interview. I explained that a semi-structured interview allows the interviewer and interviewee to ask related questions and to make comments on the topic. Additionally, I explained that if they wanted something omitted from their recorded responses, I would oblige. They were informed of all aspects related to confidentiality and anonymity. I then explained that the interview followed a format where the questions were structured under the following headings: biographical, teachers' understandings of how digital technology can support reading, using digital technology in the classroom and the challenges and opportunities they face. I explained that the consent forms they signed indicated that semi-structured interviews would be audio-recorded with their permission and then be transcribed. I ensured that the teachers knew that I was attentive to verbal and non-verbal cues. As these were semi-structured interviews, sometimes I probed for clarification and elaboration. To end the semi-structured interviews, I first asked them if they had any questions or comments to add to the interview, after which I thanked them, and then I stopped audio-recording. I told them that if they would like to review the transcriptions, they were at liberty to do so (member checks). Lastly, I informed them I would share my completed research with them if they were interested.

3.6.3 Participant Observer

In this study, I chose to be the non-participant observer. Busetto, Wick and Gumbinger (2020, p. 3) explain that "in non-participant observations, the observer is 'on the outside looking in' … present in but not part of the situation, trying not to influence the setting by their presence". I wanted to observe the lessons without influencing the teachers and learners in any way. I wanted to gain an understanding of how the teachers used digital technology to support reading development in their Grade 1 classes, and thereby better understand their experiences of using digital technology in reading lessons. In being a non-participant observer in this study, I watched teachers Alex, Mpho, Darcy and Kim use digital technology to support reading development. I wrote notes guided by a semi-structured observation schedule (Appendix B). I chose to be a non-participant observer in this study as I wanted to understand how the teacher actually used digital technology in real-life situations to support reading development without any external influence. The non-participant observations also allowed me to be more reflexive as a researcher (Olmos-Vega, Stalmeijer, & Varpio, 2023). This allowed me to examine my judgements, thoughts, ideas, beliefs and practice while I generated the data from the observations. This meant that by being a non-participant observer

I was able to reflect my own personal beliefs which could have impacted on the data generation process. My reflexivity allowed me to focus on the data which was being gathered without it being skewed by my possible bias. Lareau (2021) explains that when a researcher is a participant in a classroom, this creates issues of power between the teachers, the learners and the researcher. However, as a non-participant observer, such issues are lessened, but do not disappear entirely. In my observation, my role as a non-participant observer helped as I did not notice any issues of power between the parties involved. I believed this was so because I explained first to the headmistresses what my plan was, then the teachers, and lastly to the learners. All parties were aware that I would not be interacting with the learners; I would be simply observing the teacher delivering a reading lesson by using digital technology. During the lessons, the learners did not interact with me; however, they were friendly and intrigued to see me as a new person in their classroom.

3.6.4 Observations

Kang and Hwang (2021) explain that observations in qualitative research allow the researchers to use their senses to collect data by looking and listening in a systematic and meaningful manner. Classroom observation in educational research is an important tool in fostering key pedagogical skills for teacher-learning, policymaking and educational reform. It also forms the basis for better understanding and enhancing teachers' practice (O'Leary, 2020).

Observations allow the researcher to see the bigger picture by observing the participant in his/her natural environment (Fetters & Rubinstein, 2019). In this study, following the interviews, I spent two days in each teacher's classroom; however, I only observed one reading lesson that used digital technology in each class, as the observed lesson was dependant on teachers' schedules and lesson times, and when they would be using digital technology in their reading lessons. The observations in this study allowed me to observe the teachers conducting their reading lessons while using digital technology to better understand their teaching methods.

The technique of observations in addition to the semi-structured interviews, allowed the researcher to confirm teachers' responses with what was actually occurring in classroom practice. As such, observations provided me with information which was previously unknown to me but was crucial in understanding teachers' experiences of using digital technology to support reading development. I utilised oa semi-structured observation schedule (Appendix

B) to understand and interpret participants' behaviour. The contents of the semi-structured observation schedule were chosen after reviewing many different semi-structured observation schedules, and by discussing with peers what I was looking for by utilising observations.

Additionally, field notes, guided by the semi-structured observation schedule, assisted in understanding teachers' practices. They were used to better understand and explain teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts. This was done by verifying data from the interviews with those from observations (Cohen et al., 2018). The data from observations were reviewed and coded in a similar manner to which the interviews were as I was looking for themes from the interviews to coincide with those from the observations [Appendix C] (Byrne, 2022).

Initially, I relied on a semi-structured observation schedule which I tried to fill in; however, the teachers' lessons did not necessarily follow the normal structure, so I wrote field notes on what I observed on another page that was not included in the semi-structured observation schedule. This allowed me to observe and record what was necessary even though it did not follow the semi-structured observation schedule. However, I ended up describing the lesson better on a separate piece of paper which was later typed and merged into my semi-structured observation schedule (Appendix F).

Data in this study was generated through semi-structured interviews and observations. These ensured that I collected data which was rich and in-depth. Data was analysed to understand teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts.

3.7 ANALYTICAL PROCEDURES

The analysis of qualitative data is understood by Gibbs (2018) as a challenging process due to the amount of data generated, even in a small scale study. As the aim of qualitative research is "to gain a better understanding of phenomenon through the experiences of those who have directly experienced the phenomenon, recognising the value of participants' unique viewpoints that can only be fully understood within the context of their experience and worldview" (Castleberry & Nolen, 2018, p. 807-808). As such, a large quantity of data was generated to understand the meaning which "people place on actions, events, and relationships" (Castleberry & Nolen, 2018, p. 808). The data was generated from four semi-structured interviews and four lesson observations. The data collected for the study was centred on the research aim, objectives, and research questions. As such, the semi-structured

interview guide was designed to answer the research questions, with assistance from data collected from the observations. The next chapter (4), discusses the data in line with the thematic analysis process as recommended by Braun and Clarke (2006) while being aware of the TPACK framework underpinning this study (Mishra & Koehler, 2006). Similarly, Akram, Abdelrady, Al-Adwan and Ramzan (2022, p. 1) advise that "the rapid expansion of the Information and Communication Technologies (ICTs) has transformed learners into digital learners, requiring teachers to integrate technology into their pedagogical approaches, where teachers' attitudes, technological knowledge, and skills play a significant role in its effective integration". Hence, this knowledge is essential when thematically analysing data in line with the TPACK framework (Mishra & Koehler, 2006).

Thematic analysis applied to analyse the data using the six (6) steps suggested by Braun and Clarke (2006). This method involved organising and describing the data in rich detail. It also entailed different interpretations of the phenomenon under investigation to answer the research questions (Braun & Clarke, 2006). Thematic analysis is explicitly analyst-driven as the researcher specifies particular aspects of the data to be analysed (Braun & Clarke, 2006). Whilst it may not provide a comprehensive description of the dataset, thematic analysis allowed me to analyse specific elements of the data that were related to my research aim, objectives, and research questions pertaining to teachers' experiences of using digital technology to support reading development in Grade 1 classrooms.

Braun and Clarke (2006, p. 16-23) identify the following six stages of thematic analysis:

- familiarising yourself with the data
- generating initial codes
- searching for themes
- reviewing themes
- defining and naming themes
- producing the report

3.7.1 Stage 1 - Familiarising Yourself with the Data

The first stage of thematic analysis involves immersing oneself in the data by reading and re-reading the data transcripts or listening to the audio-recordings (Braun & Clarke, 2021). To become familiar with the data, I repetitively read the transcribed data. I also selected parts of the interviews where the tone of voice and intonation in audio-recordings were relevant to better understand the participants' perspectives and experiences.

3.7.2 Stage 2 - Generating Initial Codes

In stage 2, I organised the data in a systematic and meaningful way by coding it. Braun and Clarke (2013, p. 121) contend that coding is more than a data reduction method, but rather an analytic process which captures the systematic and conceptual reading of the data, as "the researcher codes every data item and ends this phase by collating all their codes and relevant data extracts". During this stage, I looked at aspects from the interviews and observations which were found across participants. I created 46 codes which I used to organise the data in a manner which was systematic and easy to understand (Appendix D). Below in Table 3.2 is an extract of the preliminary coding for Mpho:

Table 3.2: Extract of the preliminary coding for Mpho

Mpho's Quote	Codes
All of it's been informal and it's just courses that you've attended. Being a conference on technology or you yourself, the school you go to, the technology teacher brings in different types of websites or websites you found on your own, but different apps which might be used, which they then show you how to use, which you then implement and use in your classroom.	2. Training - informal 11. Support-school 1. Training - formal 3. Teacher agency

3.7.3 Stage 3 - Searching for Themes

The third stage of thematic analysis involves searching for themes, defined as "a coherent and meaningful pattern in the data relevant to the research question" (Clarke & Braun, 2013, p. 121). During this stage, the codes are analysed and considered in terms of how they intersect to "form an overarching theme" (Braun & Clarke, 2006, p. 19). I organised the 46 codes I identified in stage 2 into a number of overarching themes (Braun & Clarke, 2021). The coded data was reviewed and analysed to see how the different codes may be combined in order for them to form themes and/or sub-themes (Byrne, 2022). The themes were derived by meaningfully grouping similar codes. Byrne (2022, p. 1403) maintains that "themes should be distinctive and may even be contradictory to other themes, but should tie together to produce a coherent and lucid picture of the dataset". I reviewed the 46 codes together with the generated data and grouped the codes which were similar in meaning. This was done by looking at the generated data together with the codes. I then realised that there were many codes which in different ways related to the training of the teachers and the support (or lack

of) teachers were receiving from the school, colleagues, and parents. I then took all the codes (while noting the quotes) and linked them to this 'theme' and later grouped them. I also reviewed the generated data and quotes and found that some of the codes linked to the grouped ones so I included them into this group as well. For example, under the grouping of the *training of teachers and the support from the school, colleagues and parents* I noticed that when teachers were supported and trained, they were able to see digital technology as something advantageous to their teaching (Appendix G).

While sorting the codes into themes, I reviewed the relationships among the codes to ensure that they were categorised correctly. I then re-read the transcriptions from the semi-structured interviews to ensure that I had fully made-sense of participants' responses in a meaningful way (Braun & Clarke, 2021). Lastly, I checked my observation field notes to confirm the correctness of the data, and to verify whether the themes matched what was observed during the lessons. For example, the initial theme on the role of the teacher was clearly definable across all the semi-structured interviews, thus this became the initial theme with sub-themes of age and experience of teachers, teachers' thinking about digital technology, and importance of digital technology (Appendix G).

3.7.4 Stage 4 - Reviewing Themes

The fourth stage of thematic analysis "involves checking that the themes 'work' in relation to both the coded extracts and the full dataset (Clarke & Braun, 2013, p. 121). Byrne (2022, p. 1404) states that this stage "requires the researcher to conduct a recursive review of the themes in relation to the coded data items and the entire dataset." This includes a process of reviewing and refining the preliminary themes. I checked that the themes accurately represented both the coded extracts and the full dataset (Braun & Clarke, 2021). As suggested by Braun and Clarke (2012, p. 65), I asked myself several questions during this process:

- Is this a theme or a code?
- Does this theme provide useful information about the data to help answer my research questions?
- Does this theme provide useful information about the data and help answer my research questions?
- Is there sufficient meaningful data to support this theme?
- Do the themes link to each other?

This line of questioning allowed me to make-sense of whether the themes meaningfully captured the codes in relation to the datasets. During this process, I occasionally reviewed and edited some of the preliminary themes and/or sub-themes that were not well supported by the different datasets. For example, I initially had the following themes: Teacher ambivalence regarding the use of digital technology, balancing books and screens (learners), fostering learner agency through digital technology, training and support, teacher agency, the emotional labour of working with digital technology, and digital technology as a vessel for teaching and learning.

Accordingly, I reviewed the research questions:

- What are teachers' perceptions and experiences of using digital technology to support reading development in Grade 1 learning contexts?
- What challenges do teachers experience when using digital technology to support reading development in Grade 1 learning contexts?
- How do Grade 1 teachers' experiences of utilising digital technology to facilitate reading development in their classrooms lead to the emergence of new insights and understandings?

This allowed me to determine which preliminary themes were not in sync with the data generated to answer the research question. Thus, after editing and careful reviewing of the generated data and research questions, I finalised the thematic framework (Figure 3.1).

3.7.5 Stage 5 - Defining and Naming Themes

In the fifth stage, the researcher has to present a detailed analysis of the thematic framework where each theme and sub-themes are expressed in line with the datasets and the research questions (Byrne, 2022). I ensured that each theme provided a coherent and consistent account of the data that could not be expressed by other themes (Braun & Clarke, 2021). Simultaneously, I ensured that the themes created a lucid story of teachers' experiences of using digital technology to support reading development in Grade 1 classrooms. I had to also ensure that the themes were related to the study's research questions.

Defining themes requires a deep analysis of the generated data. Byrne (2022) states that it is likely that there will be many data items which support each theme. As such, the researcher at this stage needs to identify which of the data items should be used as extracts in the writing up of the analysis (Clarke & Braun, 2013). Byrne (2022, p. 1407) adds that "the chosen extracts should provide a vivid and compelling account of the arguments being made by a

respective theme". In doing so, multiple extracts should be used from the generated data elicited from the semi-structured interviews and observations in order to "convey the diversity of expressions of meaning across these data items, and to demonstrate the cohesion of the theme's constituent data items" (Byrne, 2022, p. 1407). As such, the reported data extracts must go beyond simply reporting what the participants articulated in the semi-structured interviews, but must connect to the observations to answer the research questions in line with the theoretical framework (TPACK) of this study (Mishra & Koehler, 2006). Hence, this creates a thematic and analytic narrative which explains to the reader why the extract is important for the study (Byrne, 2022). The themes and sub-themes for this study are illustrated in Figure 3.1 below:

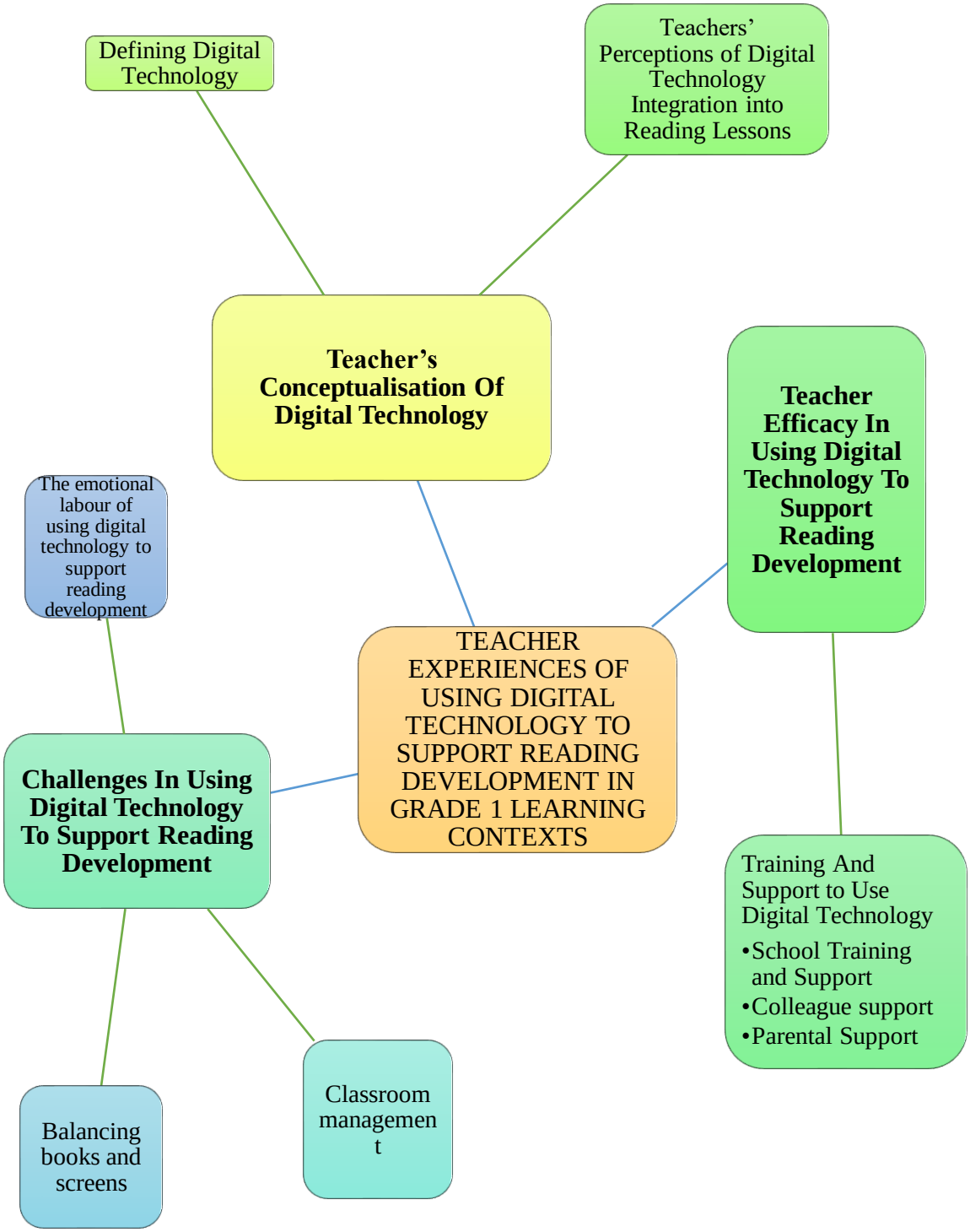


Figure 3.1: Themes and sub-themes

Figure 3.2 below is an excerpt from the sub-theme - *teachers' perceptions of digital technology integration into reading lessons* - which demonstrates the ways in which a dataset

may be reported in an illustrative way. Teachers were asked to describe digital technology and how they used it in their reading lessons. The intention was to make-sense of the ways in which their understandings of digital technology influenced their teaching of reading practices. Below, Mpho reports on her understandings of digital technology and how she used it in the classroom.

It's the use of technology, meaning it could be an iPad, a computer, something... it's digital. It's not a hard book that you're using.

I will often use a lot of websites for phonics, to be able to watch a video with them, where we read on the video, and then we'll, from that, just take out the sounds, because we're doing it for a specific sound, and then use that to create a word list. And sometimes we'll play a game also with phonics... but once, twice a week. But like they're using Reading Eggs...Specifically, on Seesaw, there are some activities that you might use. And there's a website called Letters and Sounds, which on that website you get a whole lot of different games so that one website takes you to different games, where you can play phonics games related to the sounds that you are doing

Whilst Mpho struggled to clearly articulate her understanding of digital technology, our conversation in the semi-structure interview revealed that she used a number of digital tools including videos, games, apps, web sites for both reading and maths instruction. The classroom observations further confirmed her use of technologies like a projector and a laptop for displaying a digital video story as well as learner iPads with the Seesaw app to complete activities based on the story. This reveals her agency in navigating the pathways of the range of digital platforms available to support learning.

Figure 3.2: Extract from the sub-theme – *Teachers' perceptions of digital technology*

When naming and describing themes, I found it useful to examine the datasets to identify a short impactful quote that captured the essence of the theme. This helped in emphasising the meaning and significance of the theme.

3.7.6 Stage 6 - Producing the Report

In this sixth step, I planned the write-up of the data analysis. Braun and Clarke (2012) state that the write-up of the research report is linked to the entire data analysis process. As with the other steps of analysis, this final step is recursive as I had to continuously make changes to the presentation and discussion of the research findings (Byrne, 2022). I had to establish the order in which the themes would be reported on so that the themes connected in a logical and meaningful way (Braun and Clarke, 2012). I thus decided that each theme would build on

each other. I eventually resorted to the following order when reporting on the themes: teachers' conceptualisations and efficacy with technology for reading development, teachers' efficacy in using digital technology to support reading development, and challenges in using digital technology to support reading development.

3.8 REFLEXIVITY

In qualitative research, it is important for the researcher to be reflexive throughout the research process. It is thus important that researchers acknowledge their role in the research process including reflecting on their assumptions, beliefs and previous experiences - all of which influence the research process. Palaganas et al. (2017, p. 426) understand reflexivity as a "journey of discovering how we, as researchers, shaped and how we were shaped by the research process and outputs". This is done to understand the social phenomenon; in this case, teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts.

Prior to the commencement of the study, I had a particular perception which I expected to discover during the research process. From my experiences I presumed that teachers would be eager to use digital technology and would be to an extent proficient in using it in the classroom, as well as understanding the use of digital technology to support reading development in the Grade 1. I went in to research sites to collect data and to conduct the study with a framing based on my own experiences and perceptions. This, however, was not the case, as I found that my perceptions were quite different from the reality in the classrooms (Olmos-Vega et al., 2023). There were deep contextual issues with regards to teachers and their use of digital technology in the classroom. A challenge I faced was that teachers were not able to talk freely during the interview as it was recorded and they did not want to say anything that could be used to perceive the school in a negative light. However, most teachers expressed their opinions freely outside of being interviewed such as during informal conversations which revealed the clear reality of the situation. However, as this was not during the recorded interviews and during the observations of the lessons, I was unable to use the information due to issues of ethical protocols. Moreover, my personal bias on the use of digital technology was cast side to provide teachers space to express their feelings, thoughts, experiences without 'outside' influence. This in turn, made me reflect on my own ontological understandings about digital technology and its use in early grade reading classrooms. This strengthened the trustworthiness of the study.

It is through “the understanding and appreciation of the inter-relationship of personal and methodological concerns” that I have been able to honour and understand the research participants (Palaganas et al., 2017, p. 427). Reflexivity has made me aware of my contribution towards the “construction of meanings and of lived-experiences throughout the research process” (Palaganas et al., 2017, p. 427).

3.9 TRUSTWORTHINESS

In qualitative research, the researcher has to ensure that the study’s findings are trustworthy. Yin (2014) maintains that qualitative researchers hardly speak about reliability or validity - as is done in quantitative research, instead they prefer the concept of trustworthiness. As qualitative research in itself is highly variable, trustworthiness as a quality criteria ensures correct and accurate execution of the research process (Yin, 2014). In qualitative research, trustworthiness comprises of four criteria: credibility, transferability, dependability, and confirmability.

Credibility has similar concerns to those of internal validity - the results must be consistent with reality (Stahl & King, 2020). The credibility of the data can be assured through multiple perspectives. In this study, a multiple-case study design was used such that information was collected from various sources, thus strengthening credibility (Creswell, 2012). The data generation process consisted of interviews with participants and observations of their practices. Through the literature review I could identify key concepts that I depended on when I structured my interview questions. This helped me to ensure credibility as the same themes arose during the data analysis. To ensure that the data collected was credible, I clarified all processes of the research with participants before the interview (Aguinis & Solarino, 2019). This was followed by member-checks which gave participants an opportunity to authenticate the transcriptions of the semi-structured interviews; in case of incorrect textual recording of responses, I would correct all mistakes.

Transferability addresses the applicability of the findings to similar contexts. A rich description of the findings from multiple data generation methods is needed to achieve transferability (Stahl & King, 2020). The in-depth description of the research context, process, assumptions and analysis provided the relevant information to determine if the findings from the study were transferable or not (Yin, 2014). However, as this is a small-scale study, my intention was not to generalise the results to other contexts, but rather to understand teachers’ experiences of using digital technology in Grade 1 contexts. Also, using

the TPACK model enabled a layering of evidence, theory and literature to make data analysis and presentation credible and transferable.

Dependability refers to an in-depth description of the procedures and analysis of the study, which allow for it to be replicated (Stahl & King, 2020). Through well-documented, rigorous data generation procedures and analysis, dependability can be achieved. In this study, dependability refers to the changing context of the research study, including its effects on this study. As such, I wrote field notes during my observations, and audio-recorded the semi-structured interviews. A fundamental question that I had to ask myself was how do I know that the findings were believable and will it be received as being trustworthy in terms of the phenomenon under studied? Therefore, a very important responsibility of a researcher is to ensure that the results of the research are authentic at all times. Creswell (2012) concurs, but adds that trustworthiness in qualitative research indicates that the researcher's approach is consistent across different researchers and different projects. Trustworthiness therefore rests on the researcher's insight, consciousness, uncertainties, and questions.

Confirmability is concerned with getting as close as possible to the objective reality in qualitative research. Confirmability ensures that the data and findings are not influenced by the researcher's bias and assumptions, but instead neutrality is evident (Stahl & King, 2020). In this study, confirmability was ensured in the same manner as credibility was confirmed. The participants were given the opportunity to review the transcribed semi-structured interview audio-recordings to confirm that all the information presented was accurate (Yin, 2014).

Triangulation in qualitative research is linked to credibility and refers to using several data sources to establish identifiable patterns. This means there needs to be visible corroboration between the data collected from various sources to strengthen trustworthiness. Thus, I used various data generation sources and strategies to ensure trustworthiness. The questions asked in the semi-structured interview were reviewed and revised with peers and my supervisor prior to the interviews. This ensured that questions were easily understandable to avoid possible ambiguities. The multiple case-study design which engaged four teachers in interviews elicited data that was analysed in-depth, which enhanced the study's trustworthiness. The criteria for the trustworthiness of this study were applied to achieve credibility, transferability, dependability, and confirmability.

3.10 ETHICAL PROCEDURES

Yin (2011) explains that when research is done by engaging human participants, it is necessary to ensure that harms or risks are minimised, human dignity is respected, privacy is considered, and autonomy prioritised. Prior to conducting the research, I received ethical approval from University of the Witwatersrand Human Research Ethics Committee (Non-Medical), clearance number H23/06/06 (Appendix H). The ethical principles were upheld throughout the study. The study was considered to be risk-free to the participants, and I aimed to ensure that they were in no way negatively impacted by this research study.

Burton and Bartlett (2009) refer to ethical principles stated as involving informed consent, confidentiality and privacy, honesty and openness, avoiding harm, and obtaining access to findings - all were strictly followed in this study. In accordance with these principles, the participants were treated with respect and dignity.

Informed consent was received from all selected participants (Burton & Bartlett, 2009). A permission letter signed by the principal was received from each of the two schools stating that I had permission to conduct research at the school. Consent forms were received (after signing) from the four teachers prior to the commencement of semi-structured interviews. The parents or guardians of the learners gave permission for their children or wards to be observed (indirectly) in this study - assent forms were received from the learners.

I also, explained to all participants that confidentiality and anonymity were protected through all processes of the study including the 'write-up' of the study (Burton & Bartlett, 2009). They were informed that the results of the study would be available on request. Also, the semi-structured interviews were audio-recorded with consent from the participants. They were informed of their right to privacy, confidentiality and anonymity; hence, pseudonyms were assigned to each participant and each school. All information elicited from the interviews and observations was stored in a virtual cloud with identifying features removed and with necessary security on my personal laptop.

In accordance with honesty and openness, I ensured that at all times I was consistent, clear and truthful in my interactions with all involved in this research (Burton & Bartlett, 2009). To ensure that they were comfortable during the semi-structured interviews, I asked them to choose the venue. The semi-structured interviews were informal and I tried to create a safe, cordial, relaxed, and conducive environment to ensure ease of the participant during the

process. Prior to the interview, I informed the participants that that they were at liberty to withdraw from the study at any time without being penalised in any way.

This study was considered as one with minimal risk to its participants. This meant that the likelihood of harm (physical or psychological) during this study was almost nil (Burton & Bartlett, 2009). All participants were given the opportunity to read the completed research report and give feedback prior to publishing which formed part of the research validation process.

3.11 LIMITATIONS

This study is not without limitations. Firstly, the research sites used in this study were considered as a limitation within the study because they both were private schools; hence, the findings cannot be applicable to schools in the larger number of South African schools which have disparities in resources, teachers, training, and access to digital technology.

Secondly, the sample size was very small with only four participants, thus making this a very small-scale study. Therefore, making strong claims of generalisation was difficult. This is because the findings cannot be extrapolated because of the size of the sample and the research context itself. However, for this study, I believe that the methodological approach allowed for close examination of the teachers' experiences of using digital technology. In addition, whilst the sample size was small, my intention was never to extrapolate findings to other contexts, but rather I wanted to generate understandings of Grade 1 teachers' experiences of using digital technology to support reading of Grade 1 learners.

Thirdly, the small sample size increased variability which can affect the reliability of the results (Creswell, 2018). As a researcher, to avoid this bias I explained all research processes in detail to all relevant people in this study. This included the methodological approach, research paradigm, sample choice, participant selection, data generation methods, and data analysis procedures. This may have reduced researcher-bias, but as humans no research is completely free of bias.

Fourthly, the research sites used in this study were also considered as limitations within the study. This was because the sites were both private schools, and the findings from this study could not be generalised to other schools in SA.

Fifthly, semi-structured interviews did not yield as much open conversation as anticipated due to the interviews being audio-recorded which inhibited the teacher-participants. I am

unsure why the teachers were hesitant to be completely open; however, I chose not to look into that.

Lastly, despite the fact that the teachers used digital technology in the lessons observed by me, I was informed that the observed lesson was not 'the norm' for the majority of the teachers. I assumed they made special efforts to use digital technology for reading development during the observed lesson to create a good impression because of my presence. Also, digital technology was used to support reading development such as the use of the projector for storytelling, YouTube videos for phonics, and apps for reading, literacy, numeracy and art. However, teachers were hardly aware that they were using digital technology for improving learners' reading proficiency.

3.12. CONCLUSION

This chapter outlined the methodology applied to explore Grade 1 teachers' experiences of using digital technology to support reading development. Also, the challenges, constraints, and opportunities they encountered in using digital technology in their reading classrooms were described. Further, it explained the rationale for the choice of a qualitative research design for this study. Moreover, details were provided on the research context, sample selection, methods of data generation, and analytical procedures. The measures taken to ensure trustworthiness, ethical considerations, and limitations of the study were dealt with. The next chapter (4) presents the analysis of the data to answer the first research question: *What are teachers' perceptions and experiences of using digital technology to support reading development in Grade 1 learning contexts?*

CHAPTER FOUR

TEACHERS' CONCEPTUALISATIONS AND EFFICACY WITH TECHNOLOGY FOR READING DEVELOPMENT

4.1 INTRODUCTION

The previous chapter (3) outlined the methodology employed to explore teachers' experiences of using digital technology to support reading development in Grade 1 classrooms. It explained the research plan, the data generation methods, data analysis, and identified key themes.

In this chapter, I present the data analysis of the semi-structured interviews and observations to address the research question: *What are teachers' perceptions and experiences of using digital technology to support reading development in Grade 1 learning contexts?*

The semi-structured interview questions were centred on three main areas: how teachers defined and understood digital technology in the context of their reading instruction practices, the integration of digital technology to support reading development and the challenges and opportunities that arose when using technology to support the reading development of Grade 1 learners. The analysis of the semi-structured interviews and observations unearthed the following themes: teachers' conceptualisations of digital technology, teacher efficacy in using digital technology to support reading development, and the challenges in using digital technology to support reading development. The first two themes are discussed in this chapter, while the third and last theme is discussed in chapter five.

4.2 TEACHERS' CONCEPTUALISATION OF DIGITAL TECHNOLOGY

This section presents the findings and discussion concerning data collected from the semi-structured interviews and classroom observations which emanated from exploring how Grade 1 teachers conceptualised digital technology in the context of their reading instruction practices. Specifically, I explored how teachers defined digital technology and their perceptions of integrating technology into their reading lessons. How teachers define digital technology in the context of improving reading influences their perceptions and experiences with integrating it with ICT (Ankiewicz, 2019; Rohaan, Taconis, & Jochems, 2010, 2012a). By starting with the definitions, the perceptions of teachers' integrating technology into reading instruction are laid bare.

4.2.1 Sub-theme: Defining Digital Technology

The starting point to make-sense of teachers' experiences regarding using digital technology to support reading development in Grade 1 classrooms was to firstly determine how they defined digital technology. The responses from the semi-structured interviews revealed that teachers had some technological knowledge of different digital technology products, their functions, and how they can be integrated into the teaching of reading (Mishra & Koehler, 2006; Norström, 2014).

Whilst all participants had an understanding of the general concept of digital technology (technological knowledge), there were differences in their depth of technological knowledge as exhibited by their specific definitions of what constitutes digital technology. Technological knowledge refers to an understanding of technologies, their affordances, and how they can be integrated into the teaching of reading (Mishra & Koehler, 2006). Some teachers had more detailed understandings such as the use of devices, whilst others had a more concrete understanding by naming specific devices. The teachers had the following to say about their understanding of what constitutes digital technology:

Mpho: *It's the use of technology, meaning it could be an iPad, a computer, something... it's digital.*

Darcy: *My understanding would obviously be anything that is using any sort of device and any sort of technology other than books or anything that you can… I'm trying to think exactly which wording to say, but a digital would be an actual use of a device.*

Alex: *Digital media in the classroom and digital media can be an iPad, a YouTube link, or an app. I don't know if I'm answering this correctly. I feel like that's digital media. Something that is not written. It's in the form of a device of sorts. That's what I would imagine digital media to be.*

Kim: *Digital technology, I think it's changed from what we saw as digital back in the day to now. I feel like everything is digital now, like the children's understanding of basic things. TV's digital in the way that it runs. We have iPads, we have laptops, the phones that they use, and all kinds of communication that they are engaging with are very much digital space.*

All four teachers acknowledged the importance of digital technology in different aspects of our lives such as education and entertainment. There was a common understanding that

digital technology involves devices such as iPads, computers, laptops, and phones which are instruments beyond traditional written texts.

Mpho and Alex's definition of digital technology emphasises the interactive and multimedia nature of digital devices such as they provide examples of digital media. Darcy, on the other hand, distinguishes between digital and analogue technologies by stating that digital technology is the use of any sort of device and any sort of technology other than books.

Kim, talked about how digital technology evolved over time, and its effects on society. She noticed the widespread influence of technology on communication. These findings suggest that teachers are aware of how technology has increasingly become integrated into our daily routines.

Norström (2014, p. 20) explains that technological knowledge is somewhat different from knowledge in other areas because it is "action orientated" and can be judged by "whether it is successful in guiding actions toward certain goals". Whilst the teachers' definitions of digital technology and providing examples of digital media and devices mostly focus on technological knowledge (TK), some of their responses also demonstrate the intersection of other knowledge domains such as TPK, PK and TPACK. For example, Alex highlights the use of digital technology in the classroom, thus suggesting the potential that technology has for changing classroom practices. However, she displayed apprehension and hesitancy in defining digital technology as she was doubtful of its true meaning. This hesitancy could be an indication of her lack of confidence or a recognition that defining technology requires more than knowledge of digital devices and media. It requires an understanding of the affordances that different digital media and platforms have to offer in the classroom (TK), the pedagogical implications that digital media has for the teaching of reading (TPK), and how digital technology can be used to teach specific reading skills and improve competencies (TCK).

Of all three teachers, Kim demonstrated an integrated perspective that aligns with the TPACK model by referring to technology's influences on children's understanding, thus implying an awareness of how technology impacts on pedagogy and learning. Whilst all four teachers' definitions varied in depth across the TPACK domains, their statements revealed the interplay between technology, content, and pedagogy.

Studies revealed that teachers' understanding of the concept of technology generally contributed to a positive attitude towards the use of technology in classrooms (Ankiewicz,

2019; Rohaan, Taconis, & Jochems, 2010, 2012). Ankiewicz (2019) adds that a person's rational and comprehensive understanding of the concept of digital technology helps to improve its use.

Jannah et al. (2020) and Spiteri and Chang Rundgren (2020) contend that teachers' perceptions, thinking, and understanding of digital technology affects the way they integrate technology into their teaching practice. Tweed, (2013, p. 2) refers to this as "the self-efficacy of teachers" which is guided by one's thoughts and beliefs, and is directly related to the way in which they integrate technology into their reading instruction. Teacher's efficacy is closely linked to the various domains of the TPACK model as it influences their confidence and competence in integrating technology into Grade 1 reading instruction.

4.2.2 Teachers' Perceptions of Digital Technology Integration into Reading Lessons

This exploration drew on data generated from the semi-structured interviews and classroom observations. The findings are presented in relation to teachers' perceived usefulness of digital technology for reading development, as well as their experiences of integrating digital technology into reading lessons.

Jannah et al. (2020, p. 1) explain that "the main factor for the success of digital based learning does not depend on the availability of digital equipment, rather in the competence of the teachers (digital skills, creative thinking, and communication skills). Further, teachers in schools with digital technology infrastructure perform better in implementing digitally-based learning than those without the infrastructure. The teachers in this study had access to various different forms of digital technology as well as the infrastructure to support it. This included laptops for teachers, iPads, and Chromebooks for the learners, projectors, sound systems, multimedia software and apps, Wi-Fi access, and back-up power for loadshedding. However, the teachers held different views on the integration of digital technology into reading lessons.

Boonmoh, Jumpakate and Karpklon (2021, p.1) maintain that the "decision about whether to use technology in the classroom often depends on the perceptions of each teacher". This view is shared by Watson and Rockinson-Szapkiw (2021) who assert that understanding teachers' perceptions of digital technology's usefulness in teaching is essential to understand how they use it in their teaching. They add that regardless of whether there is access to digital technology, if teachers have negative attitudes towards technology then providing them with excellent ICT facilities may not influence them to use it as a pedagogical tool. In the sections that follow, I present teachers' statements about the perceived usefulness of integrating digital

technology into their teaching of reading, followed by evidence of how they integrated digital technology into their reading lessons.

When Alex was asked about the benefit of using digital technology to support reading development of Grade 1 learners, she had the following to say:

Alex: *I feel like we can use it to support all kinds of reading. Reading Eggs is lovely …children do a baseline test, and it starts them off where they're at. If they're struggling with that you can scale them back and they can go a few lessons back to say single sounds as opposed to diagraphs and trigraphs and it can help them where they're at. So, I do think it is helpful in that it can support your top average and your weak kids. But obviously, that would be reliant on me going to check if they are fine, are their parents helping them at home… I guess reading eggs does work for the whole class, but we don't use it as a whole class too. I used it a lot during COVID as a whole class too. Not so much now because now we actually have our readers and things, our physical not digital things.*

Jannah et al. (2020) explain that teachers need to understand of what digital technology is, knowledge of the types of digital technologies they have available in their classroom, and how to use technology to support the different aspects of teaching. Alex's statements revealed the intersection between technological, pedagogical, and content knowledge (Koehler et al., 2014; Mishra & Koehler, 2006). She demonstrated sound understanding of the *Reading Eggs* tool and its functions which enabled her to assess their reading ability, and provide levelled reading content for all learners. This TK of how to use *Reading Eggs* is critical for effective technology integration. She also recognised that she could use *Reading Eggs* to support the development of phonemic awareness skills such as single sounds, digraphs, and trigraphs, thus demonstrating her CK. Her statements also indicate her ability to differentiate between her reading pedagogies (PK) by using *Reading Eggs* to provide support for struggling learners, thus reflecting her PCK. For struggling learners she goes a few lessons back to ensure that they acquire reading skills previously taught. Alex also described how she provided support through constant checks by engaging parents to help learners at home. Alex's statements indicated how she was able to use *Reading Eggs* to support the reading development of her Grade 1 learners by catering for their diverse learning needs through differentiated teaching.

In respect of her integration of digital technology into her reading lessons, Alex stated:

Alex: *I use digital books to show them during a story lesson. So, I would say for example if the theme is emotions. I would find a book that I could show them, and I'd stop and pause and say, Oh look the words have changed. Oh, look these are in capital which means he's shouting. Here's your exclamation mark. Here's your full stop. What does that mean? And I'd show it to them which we do often. That is almost twice a week at least. We also do phonics games to help with our reading and they're also online.*

The excerpt above displayed how Alex used a digital story and online phonic games to teach specific reading skills such as print skills, punctuation, capital letters, phonics, and word study through the digital text itself. The use of online phonic games and digital stories is underpinned by elements of the TPACK model such as TK, TPK, TCK and PCK.

Alex's lesson incorporated a blended approach, integrating digital technology such as iPads, a teacher's laptop, and a projector, alongside traditional resources like paper and pencils. An example of an observed lesson is presented below in Figure 4.1.

Alex was teaching a whole class lesson on the digraphs ea, sh, ch and th.

The learners were seated at their tables with their own iPad. Alex had her laptop connected to a projector to model activities and display the learning activities for the lesson.

Alex began the lesson by revising the concept of digraphs and the specific digraphs they had done previously (ch, sh, oo, ng, ck, qu, ee and oo). She wrote these sounds on the whiteboard and asked the learners to say the sounds associated with each diagraph. She then asks learners to make words with the sounds.

Alex used her laptop and projector to demonstrate how the learners could open the app, Seesaw and the learning activity for the lesson. She asked the learners to open the Seesaw app on their iPads and navigate to a reading activity titled "Home by the Sea." This 15-line story featured words containing the target digraphs (ea, sh, ch, and th). Learners were given 5 minutes to read the story silently. Alex provided assistance to struggling learners by helping them open the app, pointing out words, or sounding out words with them and then asking them to sound out the words themselves. She informally listened to the weak and average learners, corrected them and assisted them with comprehension by explaining the meaning of difficult words.

After the silent reading, Alex modelled reading the story aloud, and the learners then read after her. She called on individual learners to read parts of the story, with the class repeating after them. She then asked the learners to read the story again on their own. She walked around listening, correcting learners when necessary and asking learners about tricky words. After this reading activity, Alex engaged in a whole class discussion about the story, asking questions such as What is your favourite part of the story?, What do you find on the beach?, Where are some beaches near us and What's your favourite beach?

Alex then gave the learners white poster paper and asked them to divide it into four sections. She told the learners to write the digraphs ea, sh, ch, and th in each section. She then told the learners to use the story from the Seesaw app as a reference, and search for and record words containing these digraphs in the different sections on the poster paper. Alex modelled this activity by demonstrating how a word like beach would be listed under both the ea and ch sections because it contained two digraphs.

Learners were encouraged to use their iPads to find and colour-coordinate the words according to their digraphs before transferring them to the paper poster. Alex emphasised the importance of creating a visually appealing and accurate poster, as it would serve as a reference for learning about digraphs at home. Once learners were completed with their poster, she then asked them to look at a Seesaw activity on their iPads where they had to highlight the ee, ea, and ey digraphs in words. In the final activity, Alex handed out a set of pictures and asked learners to highlight the words with different diagraphs with different colours. She continuously walked around, observed learners' activities and provided support when needed. Once learners were completed with the activity, she asked the learners to switch of their iPads and hand them in to her.

Figure 4.1: Lesson Description- Alex

The lesson above demonstrates the integration of technology, pedagogy, and content knowledge as outlined in the TPACK model (Koehler et al., 2014; Mishra & Koehler, 2006). For example, her lesson focused on the teaching of specific CK of digraphs (*ea, sh, ch, and* th) in reading. She provided examples and asked learners to say the sounds associated with

each diagraph and then asked them to construct words with the sounds that they have already learnt. Additionally, Alex's PK is evident through different teaching strategies like modelling, guided practice, differentiated instruction, questioning and formative assessment techniques that included informal listening, questioning, facilitating, and supporting to promote learners' progress and understanding. Through the effective use of tools like laptops, projectors, iPads and the Seesaw app, Alex demonstrates TK. Furthermore, she leverages the app Seesaw to engage students in reading activities and provides opportunities for learners to practice. Here TPK and TCK, come into play as she integrates technology into different parts of the lesson (silent reading, guided practice, and independent reading). She uses the projector and her laptop to model activities to provide instructions for learners. Alex also uses the Seesaw app to present content specific materials (TCK); namely, the story featuring different diagraphs. She unintentionally incorporated technology-based activities as seen when learners highlighted and colour-coded diagraphs in the application. She also encouraged learners to create posters of the different digraphs, and to use pictures to highlight the different digraphs. The analysis of the lesson reveals that Alex demonstrated the ability to effectively integrate technology to support the teaching of diagraphs using different kinds of pedagogical practices.

When Mpho was asked about the benefit of using digital technology to support reading development of Grade 1 learners, she articulated:

Mpho*: Depends on how you're doing it, because if you're using it, let's say a projector, with a computer game, or a game on the screen, where you're using it like that… then it's a whole class. It supports learners as often, it's a bit of a fun practice, so that they're practicing in a different way, which often helps on that side, it's just a different way to practice the same things that you have been doing… For the individual learner it supports reading development, let's say, if he's using reading eggs, it works, it tracks their progress, so it works at the exact level where they are. And you as a teacher in that program can go back to see what they've mastered, what they haven't mastered. And they actually don't really move on until they are ready to do it. It works through the different sounds to develop their reading as they go… I will often use a lot of websites for phonics, to be able to watch a video with them, where we read on the video, and then we'll, from that, just take out the sounds, because we're doing it for a specific sound, and then use that to create a word list. And sometimes we'll play a game also with phonics… but once, twice a week.*

It is important to note that Alex and Mpho were both referring to the same application - *Reading Eggs* - and they have some perceptual similarities on how technology can be used to support reading development. Mpho demonstrated deep understanding of the *Reading Eggs* tool and its functions, and noted that it was suitable to track the individual learner's progress. She explained that as a teacher she is able to go back to check strengths and weaknesses of the learners. As such, Mpho demonstrated TK on how to use technology in reading lessons. Also, she recognised that she could use digital support for the development of phonemic awareness skills by using websites for teaching phonics, thus demonstrating her CK. Her statements also reveal her ability to differentiate between her reading pedagogies (PK) by using *Reading Eggs* as well as the different websites, videos and games to provide support for all learners, thus reflecting her PCK. Mpho's statements show how she does not move on to a new aspect of reading until learners have mastered previous skills. This emphasises the integration of technology, pedagogy, and content knowledge within the framework of the TPACK model. The utilisation of websites as a learning tool demonstrates Mpho's TK as she incorporated digital technology into the PK and educational processes. At the same time, she exhibited PK by recognising the value of differentiated learning through the use of websites as effective mode of learning. This approach aligns with literature by Levy (2009), Ramírez-Peña et al. (2022) and Yorganci (2022) who explain that reading for pleasure emphasises learners' motivation to engage through activities which they find interesting which leads to the enhancement of retention. This differentiated teaching acknowledges the individual learner's needs, thus promoting inclusivity. Leveraging digital technology to enrich PK, caters for individual and diverse learning needs while teaching the CK. This confirmed that Mpho used TK, PK and CK to create lessons which adhered to the TPACK model which formed the framework for this study. The use of online phonic games, videos and websites is underpinned by elements of the TPACK model such as TK, TPK, TCK and PCK.

Although Mpho used limited digital technology, she knew how to access websites, videos and games once or twice a week. This revealed that she may not have a comprehensive understanding of what digital technology entails (Jannah et al., 2020). Mpho's statements suggest inconsistency or confusion within her understanding of digital technology in its various forms. She claims to use limited digital technology but elaborates on her usage of several forms of digital technologies such as websites, videos, and games. As such the confusion lies within Mpho's definition of what constitutes digital technology. This implies that Mpho equates digital technology solely with advanced, complex devices such as

smartphones, iPads, laptops, and computers. Thus, she undermines her own digital engagement as she fails to see that the websites, videos and games all fall under the umbrella of digital technology. Mpho's confusion and disconnect highlights a common phenomenon where individuals do not fully comprehend and understand the opportunities or the impact of the digital tools which they use regularly (Akram et al., 2022). Digital technology underscores its importance to support reading development (digital literacy in education) even in activities which seem mundane and play-based such as games and websites which involve skills to operate particular technologies (Mishra & Koehler, 2006, p. 1027). However, there is a gap in Mpho's TK as evidenced by her limited use of technology to teach reading to her learners. An example of an observed lesson is presented below in Figure 4.2:

Mpho was teaching a whole class lesson on ee and ea words.

The learners were seated at their desks with their individual iPad's. Mpho had her laptop connected to the projector and speakers to play a story called Fred Flea in the form of a video from YouTube which was read by the voice in the video as well as having the words of the story projected.

Mpho let the video play once, then asked the learners to read the words which the teacher pointed to as the video was playing. It was here, I noticed that the video was going too fast i.e. the pace was too quick for the learners, which resulted in them being less engaged. As a result, the teacher paused the video a few times to try to get the learners back to speed. The teacher also stopped the video at words which she anticipated that the learners did not understand and explained to them its meaning while engaging with them on its meaning in the story- this was words such as pleaded, sweet pea, jeep, leak and creaky. The teacher briefly discussed the story and its contents with the learners, asking them questions about the characters in the story and about what happened.

Mpho then asked learners to open the Seesaw application on their iPad's and go to the story called Sheep in a Jeep. This process was projected on the board to demonstrate and model to learners which could be used to follow if they did not use or understand the verbal instructions. Here she asked the learners to listen to and read the story aloud, then they were required to sort the words as ee or ea and then they were required to add a response in the form of a video or audio of them saying all the ee and ea words which they sorted in the previous activity all on the iPad using Seesaw. Mpho assisted some learners in sorting out the iPad initially but was not actively involved in the lesson after that, was self-learning. It was noted by Mpho that not all learners were reading the story, some listened to it but did not read it, she drew their attention to this by saying that they needed to read the story aloud as it would help then in the response. Mpho was walking around checking the learners doing the activities and assisting if necessary. She facilitated this lesson by managing the iPads and the lesson content available and relevant to the learners. The learners were engaged with the iPads but did not all follow the instructions correctly. Mpho had some learners play their recordings and videos aloud to her, which she corrected at the same time and had them rerecord themselves accordingly. She stated that the program corrected their sorted words and shows them to the learners instantly, which she gets a copy of, however, it does not correct speech, so she has to check those responses individually by listening to them all, either in the lesson or after.

As the learners finished at different times, the learners who finished first and their recordings were checked were told that they can open the application called Reading Eggs and do any activity they like, as there was only about 5 minutes left before the lesson time was over.

Figure 4.2: Lesson Description- Mpho

The lesson above revealed some integration of technology, pedagogy, and content knowledge as outlined in the TPACK model (Koehler et al., 2014; Mishra & Koehler, 2006). The lesson's focus was on the teaching of specific the CK of *ee and ea words* in reading. Mpho presented learners with different *ee and ea words* in the stories read by the videos, then the sorting of the words from the second story into either an *ee* word or an *ea* word, and when they recorded themselves saying the *ee* and *ea* words. Mpho's PK was evident in her lesson design and the creation of activities, incorporating techniques such as questioning, formative

assessment through discussions and by keeping learners on track and engaged. She utilised informal listening, questioning and activities to monitor the learners' progress and their understanding. However, after the lesson, she said that she was not actively involved in the lesson (shifting towards a) self-learning approach. This suggests that while Mpho effectively designed and crafted lessons and activities, her engagement with learners during the lesson itself was less traditional, with a reduced and minimal emphasis on teacher-led interactions with learners.

While Mpho used tools like the laptop, projector, speakers, iPads and the application Seesaw, her TK was not as effective as it should have been. The video presented first was going too quickly which caused the attention of the learners to dwindle, so she needed to slow the video down which is a simple procedure on YouTube. She recognised that the video went too quickly but did not know how to slow down the video, which was a simple click. Therefore, the analysis of the lesson showed that while Mpho was able to use technology to teach the *ee and ea words*, the use of digital technology was not effective. This was due to her TK knowledge being limited and because the lesson was entirely digital, thus her PK was seen through the designing and creation of the lesson but not in the lesson itself. While she was able to demonstrate an understanding of TK, PK and CK as part of the TPACK model during the semi-structured interview, this was not entirely translated into their use during the lesson (Koehler et al., 2014). This meant that her perceptions of digital technology integration regarding reading lessons were not accurate as it showed some inconsistencies between pedagogy and practice.

When Darcy was asked about the how she used digital technology to support reading development of her Grade 1 learners, she stated the following:

Darcy: *Without realizing, you're using it (digital technology) every day in your classroom. In terms of using the visualizer, if we use it with the TV, I use it every day to show them what exercise or what work they're going to do. And I can do it as a whole class. Especially in term one, when we were introducing sound and stuff, I always showed videos. I love Jack Hartmann because they can dance. When we do move and music and movement breaks, I put on a video. As a whole class its learning through a different way. It's making learning fun. If they love the app, if they love the game they're playing, it's going to enhance it (their learning and reading). So, it's a different avenue… To me, the only way that I've been exposed to how it can support learners individually is through an app - The Jolly Phonics app and the*

Reading Eggs app. In the past if a child is struggling, you'd say, we'll try something different. Because we do all the sort of written stuff at school, to make it a little bit more fun at home, parents who have engaged and supported their children using the apps, you have seen an improvement. In class with those struggling learners, they could be visual. It could help them because it's engaging and it's already got their attention. Those who don't focus could gain attention because it's flashy, it's quick and everybody loves iPads.

Abu-Hardan et al. (2019, p. 68) explain that the "TPACK (Content, Pedagogy and Technology) model exemplifies its best practices in the classroom". As such, it should be used in a way which demonstrates an understanding of what digital technology is, an understanding of the types of digital technologies available in their classroom, and how to use it to support the different aspects of teaching and learning. Darcy's statements in the semi-structured interview revealed some intersection between technological, pedagogical, and content knowledge; but not enough to demonstrate the effective integration of digital technology. Darcy demonstrated some understanding of the *Jolly Phonics* and the *Reading Eggs apps*, and noted that they can be used at school and at home for individual learners, including those who were struggling. Darcy explained that she used the iPad's, a TV and visualiser as forms of ICT (inadvertently stated). She also contended that apps, if enjoyed, led to enhanced learning through reading. Darcy's approach reflected a blend of TK, PK and CK in her practice (Koehler et al., 2014; Mishra & Koehler, 2006). This demonstrated her TK in leveraging the digital tools to enhance her teaching instruction. Additionally, Darcy's understanding of how the digital technological tools can be used to enhance learning and reading development displayed CK as she recognised the relevance of technology in supporting the teaching of reading as well as in other subjects. Hence, Darcy was generally able to integrate technology, pedagogy and content; this proficiency is effective in promoting effective teaching and learning experiences which underscores the advantages of the TPACK model which underpinned this study.

This shows that Darcy possessed some TK; however, in a later enunciation, she expressed the following:

Darcy: *Now that you've brought it to my attention, I can use a device and I know what's on our devices. But there's maybe obviously other ways to explore it. I guess there are others we can use if we have the correct devices.*

This shows that Darcy had some TK but she does not know the most effective way to use the devices. Although she has limited TK she is able to use it to motivate learners to use digital technology in different forms. Darcy did not explain how she could use the apps and games to demonstrate her CK, but said digital technology was used to make learning fun. Her responses exhibit her ability to differentiate between her reading pedagogies (PK) by using apps and games to provide support for struggling learners which reflects some TPACK features. As she was unable to explain how, technology can be used to use digital technology She mentioned that the need for a visual aid through the use of digital technology could help because it is engaging and attention-catching – even those who don't focus in class are now attentive because of flashy images - and everybody loves iPads. Lamentably, Darcy's understanding of digital technology does not indicate that she is able to use the different apps and games to support the reading development of her Grade 1 learners in line with the TPACK model (Mishra & Koehler, 2006).

With regards to her integration of digital technology into her reading lessons, Darcy stated:

Darcy: *A few years ago we were so excited when we first got our iPads in the classroom, because of these software games. There are so many apps and so many games that can make it fun. But if they don't work that's what frustrates me with technology. If it doesn't work then actually it's more frustrating. Even having TVs in the classroom with load-sheading… I'll plan and lesson and I want to show them a YouTube video to introduce a topic. We're talking about rugby and yesterday we wrote stories. We wrote stories about good luck messages to the Springboks. I wanted to pay them some videos of people's videos to just set the mood, set the tone, get the kids excited, and hear what other people have said to wish them luck for the rugby, and I couldn't. So, your lesson falls flat. I can say it all and I read it off my laptop, but I couldn't set the scene. Technology can let you down. That's so it's disappointing.*

This above evidence confirms that Darcy knew some aspects of the TPACK model. Darcy demonstrated TK when she explained that there were many apps and games that can make reading fun-filled. However, an understanding of technology but not applying it in practice in the classroom can impede the integration of digital technology and pedagogics, and thus the quality of reading lessons. Darcy stated that when technology does not work it becomes frustrating, implying that much training in the practical use of technologies is necessary. Darcy also demonstrated evidence of understanding TCK as she used digital technology in the form of a YouTube video to introduce a topic in class. She also demonstrated PK by

creating lessons which set the tone to get learners excited, thus indicating that she has specialised knowledge to create an effective teaching and learning environment for all her learners and their individual needs. As such, this excerpt described how Darcy used digital technology in her lesson, but was somewhat limited on how it was used to support reading development. This was because she used videos just to set the mood, the tone, and get the learners excited; but this was not aligned to the TPACK model which framed this study.

Darcy's lesson used rotations involving three groups, with each group relying on digital technology by using iPads and desktops to work on the application *Reading Eggs* with no teacher involvement. The lesson is presented below:

Darcy was teaching a group in a rotation lesson.

Learners had 15 minutes at each 'station' and then moved on to the next. They were separated into 3 ability groups- low, average and top but were called something else which the learners were familiar with. Darcy was sitting on the carpet with the first group doing group guided reading with physical books. The teaching assistant was with the second group outside, playing phonics bingo. The third group was by themselves using the application reading eggs on the iPads and desktops. There was no teacher involvement in this aspect unless necessary.

The teacher asked the learners to get into their groups and explained that each learner would get to do every activity, as the iPads were out the learners were very excited to 'play' with them. The teacher explained what would happen in the lesson and that at 15 minutes she would call out and the learners would swap accordingly. The learners went to their groups and did as told. The learners on the iPads and desktops logged onto the Reading Eggs application, however some had difficulties in typing in their passwords and finding their name with the correct password and needed the teacher to help them. The teacher left the group guided reading in each rotation to help the learners with the iPads and desktops to login. Here the learners 'played' on reading eggs individually. They done activities where they: matched words to sounds, used letter tiles to make words, listened to sounds with pictures and matched the words to the picture, picked objects which started with a specific sound, listened to a book read to them by the application with the words at the bottom and the learners needed to match the picture and sound to the correct word, done a wordsearch, read through a rhyming book and built a story.

However, during the rotations, it was clear that the learners who were on the iPad were on edge, because when their time was up to move to the next station, they whined and complained and some even fought because theirs took too long to get started so they had less time with the iPad. During this rotation lesson, the power was interrupted by loadshedding, so the Wi-Fi was temporarily stopped, this caused the learners to panic and throw tantrums, which the teacher said was what happens when they used technology. A learner threw the iPad on the floor when the application wasn't letting the learner login. Another learner was told by the teacher to work on a desktop doing the exact same thing, if the iPad wasn't working, to which the learner sat by the desktop and cried. The teacher did not know how to deal with these types of tantrums, she told the learners that using the iPad and desktop was a privilege and they were not respecting the devices, their teacher or their friends. It was clear that the problems experienced in this lesson were ones which hindered the teacher from using digital technology further.

The lesson ended with the teacher calling all the learners back into the class and into their seats, having them get settled and to them about their behaviour when using devices and asking why there had been so many challenges during that lesson.

Figure 4.3: Lesson Description - Darcy

The lesson above does not demonstrate the integration of technology, pedagogy, and content knowledge as outlined in the TPACK model (Koehler et al., 2014; Mishra & Koehler, 2006). She used the technique of rotational group work with ability groups - demonstrating her PK as she used group-guided reading and phonics activities. However, as Darcy does not interact with the learners working on the iPads except to help them login and deal with issues, there was no PK in that aspect of the lesson as the activities on Reading Eggs are at the individual

learner's level but entirely produced by the application. Darcy did not focus on teaching the learners on the iPads, but let the application *Reading Eggs* do the teaching, thus not demonstrating any CK with working with the iPad, but group-guided reading and phonics bingo demonstrated her CK. The way Darcy used the application in the lesson showed that she did not possess sufficient TK to effectively integrate technology into her reading lessons, despite her lengthy explanations. Her perception of digital technology integration into reading lessons was vague as she was under the impression that by learners working independently on their iPads reading proficiency would be enhanced; but this was not the case. This is clear from the research conducted by Jannah et al. (2020, p. 2) that "current learning patterns illustrate that not all teachers apply digital-based-learning in the classroom, and that integration of digital technology in learning has obstacles [such as] teachers not being able to utilise digital technology in the classroom due to lack of knowledge, skills, training, self-confidence, and limited facilities". From the lesson structure and the interview, it can be understood that she did not actually understand how to use technology regarding content and pedagogy, and as a result did know what to do with the technology in order to deliver a reading lesson by using digital technology as a supportive teaching tool (Mishra & Koehler, 2006). Also, technical disruptions and behavioural issues prevented Darcy from fully and effectively integrating TK, PK, and CK in practice.

When Kim was asked about the benefit of using digital technology to support reading development of Grade 1 learners, she articulated the following:

Kim: *I think it's a different vessel, it's a different avenue to explore whatever it is you were taught in the classroom. In a classroom situation, one, in terms of reading, if I'm not a good reader, I rely on the teacher, their pace, their enunciation, and their body language to kind of decipher and work my way through a passage. When it comes to digital technology, I think there are so many other picture cues around that a child can look at and go. Okay, that makes a little sense. Oh, there's a chicken, they must be speaking." Whatever it is, but I think it stimulates far more than in a classroom environment… It's not a matter of how will I use it (digital technology), it's what I'm doing with it. Because, for example, this is Reading Eggs. Reading Eggs, I might be looking at phonics. So, I'll go with the fast phonics in terms of the app that I'm using at that current time. I might be looking at reading a passage and trying to go through that and answer certain texts in terms of comprehension style. I might be looking at placement tests, which is another lovely thing that you can do in an IT space where, in order to do the program, like a Reading Eggs program, I need to know where you're at as an*

individual. So, I can do a lovely placement test to help me go. Actually, you don't need to start at level 1, we can start at 15 because that's where you're at.

Kim had a different perception of the integration of digital technology into reading lessons. She explained that digital technology has changed with the times. This is further explained by Boonmoh et al. (2021) mention that learners in Grade R-12 in recent years have lived and been surrounded with technology access throughout their entire lives to become 'digital natives'; whereas teachers are 'digital immigrants' as they have to adapt to the language and learning styles of the 'digital natives'. Kim's statements reveal an intersection between technological, pedagogical, and content knowledge - components which make up the TPACK model (Koehler et al., 2014; Mishra & Koehler, 2006). Kim has a good understanding of the use of digital technology as a whole, and of how to use apps and programmes such as *Reading Eggs* and *Purple Mash* to support reading development. She recognised that *Reading Eggs* allows her to see first where the individual learner is, through the use of a 'placement test' and then customising the learning according to learners' abilities. Kim also stated that digital technology provides picture cues which a child can look at and learn. As such, she recognised the affordances that digital technology presents through apps and programmes. Kim also explained that there were issues regarding the content knowledge on these apps or programmes. She stated the following:

Kim: *Sometimes the actual language you've got to share with children and help them understand. A text might come up and it will say. Her brolly wouldn't open. And now there's confusion to go, what's a brolly? And you go. Oh, in England, they say brolly instead of umbrella. That type of thing, so it's a very Western kind of concept. Hopefully, we'll have South Africans develop certain things where we go, Hey, I see myself in that. But there are programmes like Purple Mash that we use. Often, they'll have featured kind of spaces where they'll do a Heritage Day because we're coming up for heritage time. Or they'll do a Rugby World Cup or whatever it is, but they'll do South African things that the children can relate to.*

This excerpt reveals that the teacher has significant CK to understand that South African English is different to that used in other countries where the apps were created. It also shows that there is an intersection between her CK and TK as she recognises the apps which are more appropriately suited to South African learners. Kim also demonstrated her ability to differentiate between her reading pedagogies (PK) using *Reading Eggs* to provide support for

all learners, thus reflecting her PCK. Kim's response shows that she is able to use *Reading Eggs* and *Purple Mash* to support the reading development of her Grade 1 learners through differentiated teaching. Kim thought digital technology was different but agreed that change and adaptation was necessary for better results, and that the method of attending to learners different and diverse needs can be facilitated through the use of digital technology, including teaching and learning reading. The semi-structured interview with Kim demonstrated that she had a sound understanding of digital technology and its use in supporting reading development, which was aligned to the TPACK model. Kim sees digital technology as an avenue to explore and reinforce classroom learning by catering to the diverse learning needs of her learners. She recognises digital technology as the tool to enhance teaching practice. Kim's approach demonstrates PK as she recognises the need to adapt her instruction to meet the individual needs of her learners. Her understanding of how digital technology can be used to support reading development indicates CK. The TK integration into various aspects of teaching and learning, including reading, show that Kim prefers a balanced application of the TPACK model to enhance educational outcomes (Koehler et al., 2014; Mishra & Koehler, 2006). Kim's lesson is explained in Figure 4.4 below:

Kim was teaching a whole class lesson on reading a story and answering it for comprehension.

The learners were seated at their desks with their individual Chromebooks. Kim had her laptop connected to the projector and speakers to play a story called in the form of a video from YouTube on Goldilocks and the Three Bears which was read by the voice in the video as well as having the words of the story projected and accompanying pictures.

Learners were asked to login to their Chromebooks with their school login. They were then asked to open the internet and type in Purple Mash, they were then told to use their Purple Mash login to access the site. The learners struggled with this and needed the teacher to help them to find it and type it in correctly. Once all the learners were logged into the site, they were told to stop.

The teacher drew their attention to the projector which was connected to her laptop. The learners read the book following the video out aloud while the teacher watched them. After reading and listening to the book, the teacher asked the learners to turn back to their Chromebooks, which was on Purple Mash.

The teacher showed them on the projector using her laptop that they need to click on early years and Goldilocks quiz. The learners followed the instructions and came to an activity which asked them questions on the story. The learners responded in the form of true and false, typing the answer and selecting the correct answer from a variety of answers given. Learners were then prompted to do an activity on sorting the characters from the story from biggest to smallest with the correct words attached to it. They were further prompted to match words from the story to the picture. Then were prompted to do an activity where they typed up the sequence of events in the form of first, then, next and last. All while learners were doing these activities the teacher was watching each learner, assisting and correcting them where necessary. She also talked about the activities to the learners. After the learners were done, they went to a different part of Purple Mash and played a game using high frequency words, they used headphones for this game. The teacher will mark the work and return to the learners digitally.

Figure 4.4: Lesson Description - Kim

The lesson above shows some integration of technology, pedagogy, and content knowledge as outlined in the TPACK model (Koehler et al., 2014; Mishra & Koehler, 2006). Kim's lesson comprised of a YouTube video followed by comprehension activities on the application called Purple Mash. During the observed lesson, Kim had little interaction, engagement, and conversation with the learners. This was because the comprehension activities were pre-created within the Purple Mash application based on the story. Kim had selected the appropriate ones for her learners to complete. This, however, demonstrates limited PK in the observed lesson as I was unable to see specialised teacher-knowledge for creating effective learning and teaching environments.

The PK described by Mishra and Koehler (2006, p. 1026) refers to "deep knowledge about the processes and practices of teaching and learning and how it encompasses, among other things, educational purposes, values, and aims". Kim displayed little PK. However, regarding TK, it was clear that Kim had competence in using the different forms of digital technologies and understood how they needed to be used to support reading development. Regarding CK,

it was evident that Kim had much knowledge as the comprehension activities chosen were based on work done in class. The story encouraged the use of high frequency words and games which were explained at the end of the lesson. As such, Kim's lesson showed that she had a good understanding of the use of digital technology to support reading development as she used different aspects of the TPACK model to enhance the lesson. However, the use of mainly digital activities, despite they being carefully selected, does not demonstrate her PK convincingly.

In sum, the four teachers all had different perceptions of digital technology integration into reading lessons which impacted the way they conducted their lessons. The semi-structured interviews revealed an understanding of digital technologies that did not fully translate into the observed lessons. This showed that there was a disconnect between what they said and what transpired during the lessons. Some of the teachers did not have sufficient knowledge of technology (TK) despite being able to define it and operate digital devices.

4.4 TEACHER-EFFICACY IN USING DIGITAL TECHNOLOGY TO SUPPORT READING DEVELOPMENT

Teacher efficacy is the ability of the teacher to produce an intended result; in this case it was using digital technology to support reading development. Hence, the focus of this section is on the training and support which the teachers have received to use digital technology, as well as the aspect of teacher agency which comes into play when training and support is lacking.

4.4.1 Training and Support to Use Digital Technology

Spiteri and Chang Rundgren (2020, p. 116) state that "research has shown that teachers' ability to use technology to plan and implement student-centred learning activities and effective communication with parents can enhance children's learning". Additionally, Geldenhuys and Fataar (2021, p. 1) explain that "providing support for teachers" was one of the areas which needed "to be addressed for the successful implementation of coding". However, this applies to digital technology as a whole. Similarly, Kabakci Yurdakul et al. (2012, p. 964) assert that "the lack of teacher knowledge, skills, abilities, or competencies related to the use of technology in teaching processes have been identified as the major barriers to technology integration". They add that what is lacking in the teacher makes it difficult, if not impossible, to use the TPACK model to create, develop and execute lessons by effectively using digital technology (Abu-Hardan et al., 2019; Chai et al., 2011; Kabakci Yurdakul et al., 2012). This will be further explored under this sub-theme in relation to

teachers' training and support regarding digital technology in this study. The teachers were all asked about what kind training (informal or formal) they received regarding the use of digital technology: The following excerpts regarding training explain this aspect:

Alex: *So I don't think I've received any. I've received some with certain apps, like with regards to certain apps but that is very informal.*

Mpho: *All of it's been informal and it's just courses that you've attended. Being a conference on technology you yourself, the school goes to, the technology teacher brings in different types of websites, or websites you found on your own, but different apps which might be used, which they then show you how to use, which you then implement and use in your classroom.*

Reading Eggs was one of the things that as a school, when it came out, you had a look at it. We liked what it did. So, the previous school I was at, you implemented it, but the training where somebody came in and showed you how the website or the app worked, but then you yourself had to work on it to see how you could use it more. So, there's some, you want a phonics video, you go and watch them and choose what you would use to teach or to use in your phonics. So no, there's no formal training at all.

Darcy: *So no formal training and informal training I would say it's just from using technology myself. But I've never done any courses on digital technology.*

Kim: *We're fortunate in schools like this that there'll always be some kind of staff development and upskilling, so whatever programs the school implements, the people that run those programs have accountability to come and actually walk us through them, just because we pay them hundreds and hundreds of thousands. So, in terms of some of the things that we use, we have Purple Mash, we have Reading Eggs, so those people will come into the school and offer their time to walk us through every aspect of their program.*

Those are the two that we outsource Purple Mash and Reading Eggs. In terms of other programmes, you load onto iPads, it doesn't mean that you've got to go somewhere. We're also a Google school, so we're quite affiliated with Google, and we run some of their workshops and some of the teachers will go into the Google-sent into the Google store, and will do some of the exams so that we can get certified and have certain levels varying across the school.

4.4.1.1 School Training and Support

Kim's explanation of the aspect of training exposed two problems; the first being that the training on-site was limited, and offsite training was available externally through Google, but and there was no comprehensive training at the school. The second was that the training which Kim referred was very product-specific rather than on pedagogical approaches to foster technology integration into classroom lessons. This means that the teachers lack of PK, CK and TK integration can be understood through this non-pedagogical type of training.

It is clear from the teachers' responses (with the exception of Kim) that they lacked training, both formally and informally, regarding the use of digital technology. The teachers found that the training which they did receive informally was insufficient as they were not properly trained to use digital technology effectively in their classrooms, specifically for reading development. As such, their understanding of digital technology was limited, and the use of it in their lessons was poor. This was both due to their limited TK and because of poor and limited training. Spiteri and Chang Rundgren (2020, p. 120) found that "the most contributing factor to technology integration was school support and the provision of training". The next set of questions for the teachers pertained to the support they received from the school, the parents, and their fellow colleagues. This was interesting to note as the Government is pushing for the integration of digital technology, coding and robotics into Foundation Phase classrooms to bring South African learners up to speed the 4IR (DBE, 2021; Schwab, 2017).

Regarding the 4IR, Schwab (2017, p. 7) explains that "we have yet to grasp fully the speed and breadth of this new revolution. Consider the unlimited possibilities of having billions of people connected by mobile devices, giving rise to unprecedented processing of power, storage capabilities and knowledge access". Hence, teachers need all the training and support they can get if they are to successfully integrate digital technology into their teaching to successfully take their learners into the digital era. Akram et al. (2022, p. 1) explain that "teacher knowledge guides a teacher's behaviour in the classroom. Teacher knowledge for technology education is generally assumed to play an important role in affecting pupils' learning in technology". As such, it is important for teachers to possess an effective and comprehensive understanding of digital technology through training and support. Further, "ICT has also transformed the education sector and turned instructional practices into [to become] more interactive and productive, as it offers various tools which are used in traditional as well as online teaching spaces and assists in building a proactive classroom environment" (Akram et al., 2022, p. 1).

Additionally, Spiteri and Chang Rundgren (2020, p. 119-122) assert that "that the amount of time allocated to training and support from the school were the two most influential factors to [foster] technology integration". This is supported by Akram et al. (2022) who recognise that teaching 'online' or using digital technologies in the teaching process is vastly different from 'traditional teaching'. Teachers encounter various challenges in teaching with digital technology, thus affecting learners' quality of learning. If the teachers themselves are not sufficiently competent in utilising digital technology, then enhancing reading proficiency will be difficult as they do not have sufficient training and support (Akram et al., 2022). Hence, Akram et al. (2022, p. 6) explain that "teachers' professional knowledge has been considered a crucial determinant for the effective integration of technology in strengthening their instructional practices". However, they also recognise that even if teachers have a positive attitude and perception towards the use of digital technology into their teaching, without support from the school, governing bodies, colleagues and even parents, the application of digital technology into their pedagogical approaches will not be successful. In essence, the integration of digital technology into lessons is reliant on more than just one aspect; it is multifaceted and requires all-round support.

The teachers explained (below) the support, or lack thereof, they received from their schools, their colleagues, and the parents:

Alex: *So I think the school supports us in the sense that they will buy the app. But I think in terms of using it to the best of our ... And they would give us some sort of training. Yes, definitely. We've had that. We don't only have Reading Eggs. We've also got an app called Seesaw. I don't know if you know about Seesaw which you can use for literacy. In terms of support from the parents, you get those that will do it and you get those that won't do it at all. Some, because of genuine excuses such as we don't have an extra iPad or we don't have ... I could just say a device. There are very few in number at this school that don't have a device. And others (parents) don't support you - they don't have time. They don't have time to sit with their kids, get them on there, and actually do it properly with them. And some do it 100%. So, I think it's a mix. But I think it will always be a mix.*

Mpho: *So no, we don't get the parents, there's no support from parents in that regard. But if it (digital technology) is used, it's used in the classroom, the moment they've actually got their code, they as children can use it whenever they want to go and use it. But the children's lives are so busy with all the other extra murals that they do, that they don't actually go onto that.*

It's there for them to use in the afternoon if they want as supplementary. It's not forced that they have to do it, but they barely use it. And as colleagues, we help each other. So, if somebody gets stuck, we've got our technology teacher who can help us, or you go to a colleague and ask for help.

Mpho did not comment on the support from the school with regards to using digital technology in the classroom as a supporting tool for reading development. When Darcy was asked the same question, she replied:

Darcy: *So we've tried but the IT department is… yeah, I don't know. We've tried if we're amongst our colleagues definitely we would also run ideas by each other, but with the IT department, I'd say no.*

I think we've never actually had to ask parents for support, other than doing mathematics and Reading Eggs at home … again, it's the same thing. Some parents are great. They encourage their children to use it. Other parents have to sit with their kids and therefore they don't have the time, so they don't do it.

This differed entirely with Kim who had a completely different experience with being supported in terms of the use of digital technology for reading development:

Kim: *Post-COVID, parents are very reluctant when it comes to the IT space. I think it's a feeling of, we've spent a year on a screen, and we don't want it anymore, and there's also the perception that the moment you are digital, in terms of whatever programs you're working on, it's just fun and games like there's no learning that comes with it, and it's gamification, it's the fact that I am teaching something, it's just through a way that I think children at that age relate to, and sometimes for adults it's hard to perceive. How are you learning when you're having so much fun like the two worlds don't come together. But in terms of support, I think I'm privileged that although there's only one IT teacher at the' ECD and Foundation Phase. There's an IT teacher at the Junior School, and there'll be an IT teacher at the High School, and together we'll sit down and run a program to go. Okay, how are we ensuring that the skill sets that we need, by the time they get too matric, and are they are actually ingrained at an age-appropriate level throughout their time at school.*

It is evident solely from the interviews with teachers that they have not been sufficiently trained, and do not receive adequate support from the school, their colleagues, and the parents.

4.4.1.2 Collegial support

Regarding support from colleagues, Alex stated:

Somebody will say look I found this video. I found this link. I found this game.

This demonstrates that the teachers will share technological resources to assist in implementing better lessons in their classrooms, but she but did not expand on that.

Mpho stated:

As colleagues, we help each other. So, if somebody gets stuck, we've got our technology teacher who can help us, or you go to a colleague and say, how do I do this, what do I do now ...

This shows that Mpho gets support when she is stuck or needs assistance with something technologically related both from her colleagues and from the IT teacher at the school.

Darcy added:

...tried but the IT department is… yeah, I don't know. We've tried. If we're amongst our colleagues definitely we would also run ideas by each other, but with the IT department, I'd say no.

This shows that when Darcy needs help and asks the IT department, she does not receive it. However, among her colleagues she is able to get assistance. In a way colleagues support each other with the minimal TK they have. Kim differed completely as she was supported by the school and her colleagues from the primary school as well as the high school.

Kim explained:

In terms of support, I think I'm privileged that although there's only one IT teacher at the ECD and Foundation Phase, there's an IT teacher at the Junior School, and there's an IT teacher at the High School, and together we sit down and run a programme. We talk about how are we ensure that the skill sets that we need by the time they get to matric, and are they actually ingrained at an age-appropriate level throughout their time at school.

This shows that Kim is well-supported by her colleagues in all the school phases, and can rely on colleagues to assist her in teaching and learning with the appropriate skills needed to promote reading proficiency in her learners.

4.4.1.3 Parental support

In terms of parental support Alex stated:

As for support from the parents, you get those that will do it and you get those that won't do it at all. Some, because of genuinely they don't have an extra iPad… And others (parents) don't support you - they don't have time. They don't have time to sit with their kids, get them on there, and actually do it properly with them. And some do it 100%. So, I think it's a mix. But I think it will always be a mix.

Mpho: *We don't get the parents, there's no support from parents.*

Darcy: *I think we've never actually had to ask them for support. And other than doing mathematics and Reading Eggs at home… again, it's the same thing. Some parents are great. They encourage their children to use it. Other parents have to sit with their kids and therefore they don't have the time, so they don't do it.*

Kim: *Post-COVID parents were very reluctant when it comes to the IT space. As such, digital technology support from parents was limited.*

Archambault and Barnett (2010, p. 1656) state that "Technological pedagogical content knowledge (TPACK) is understanding the connections and interactions between and among content knowledge (subject-matter that is to be taught), technological knowledge (computers, the internet, digital videos etc.), and pedagogical knowledge (practices, processes, strategies, procedures and methods of teaching and learning) to improve student learning". However, teachers have difficulty in integrating technology into their instructional practice due to a variety of factors including the lack of training and support and their perceptions towards the use of digital technology. Even when ICT has proven to be effective in education, this does not always translate into practice in school settings. This may be due to the existing teaching culture that feels threatened and undermined by their lack of efficacy in handling digital technologies. "Teachers using technology therefore tend to domesticate the application in such a way that it becomes congruent with their prevalent teaching practices while ignoring the affordances the technology offers" (Voogt & McKenney, 2017, p. 69). This means that instead of being proactive about the use of digital technology and making it work for them to make their teaching more streamlined and simplified, they do not take advantage of this because they lack a positive attitude, the knowledge, understanding, training and support to do so. This means that the teachers in this study lack TPACK principles to effectively implement technology into their teaching of reading (Mishra & Koehler, 2006). The TPACK

model espouses a “combined knowledge that a teacher should have regarding the use of pedagogical and technological knowledge in teaching a certain content area for educational technology integration” - this is largely lacking in the participants of this study (Kabakci Yurdakul et al., 2012, p. 965).

It is evident from the semi-structured interviews that teachers lack training and support from the schools, colleagues and parents in using digital technology in their classrooms, specifically to support reading development. Hence, the teachers have improvised by using their agency to introduce digital technology into their classrooms, albeit at a largely mediocre level.

4.4.2 Teacher Agency

Teacher agency pertains to the freedom that teachers have in making their decisions and carrying out actions to assist their learners in learning. When it comes to utilising digital technology, teacher agency encompasses the ability of the teachers to select, modify and incorporate tools and materials to improve the quality of teaching and learning. Recognising teacher agency in utilising digital technology is essential for empowering teachers to make informed choices regarding its integration into their classrooms, as well as tailoring their approaches to meet their learners’ unique needs.

Teachers who use digital technology to integrate it into their pedagogical practices with the objective of purposefully enriching learning experiences rather than simply as replacements for traditional teaching approaches, achieve quality teaching-learning outcomes. This is where the TPACK model comes into play as “TPACK is built for integrating technology in education” (Abu-Hardan et al., 2019, p. 69). This should be reinforced by training and development programmes to ensure that teachers have the requisite skills and knowledge to effectively leverage technology in education. This includes training in digital literacy, innovative pedagogical techniques, and the critical assessment of the advantages of digital resources (Voogt & McKenney, 2017).

Further, Spiteri and Chang Rundgren (2020, p. 122) explain that “when teachers collaborated and shared their projects, more ideas were developed”. Teachers teamworking with each other to create interesting lessons by using digital technology judiciously and effectively allow their lessons to be guided by the TPACK model (Chai et al., 2011; Mishra & Koehler, 2006). During the semi-structured interviews with teachers, it was revealed that they used their agency to use apps, websites, and the different forms of digital technology. They also

rely on sometimes on colleagues to maximise their quality of teaching. The teacher's agency was articulated during the semi-structured interviews:

Alex: *Definitely we have training for the apps, but in terms of using it to the best of our ability it relies on the teacher for anything that is digital technology related. I've learned myself. Using digital technology can be self-taught. I wouldn't say that I'm great but I wouldn't say that I don't know how to use it at all. Or if I didn't know how to use an app I'd find out how to use it. I'd ask and familiarise myself with it.*

Alex clearly demonstrated her agency to use digital technology in her classroom lessons.

Mpho: *The training where somebody came in and showed you how the website or the app worked. You then had to work on it to see how you could use it more. So, there's some examples, you want a phonics video, you go and watch them and choose what you would use to teach or to use in your phonics lesson.*

Mpho also displayed agency to be able to use digital technology for teaching in her classes.

Darcy: *It would be very easy to learn to use digital technology, but I don't think I know enough about all the apps that are available or the resources that are available out there to support them ...we had a huge technology drive because it came from the council that they wanted us to become a technology school and then we all got them (digital technology in the forms of desktops and iPads) in our classrooms. We had these put in and we were so happy, we were excited. We were researching apps and constantly looking at what we could use. But then when it doesn't work you get frustrated. It's not something that's easy for me because I didn't grow up with that technology and that access. So, it was something I had to learn, and I was so up for it. And when it doesn't work … So that would definitely be my only challenge in terms of learning and researching. You searching for new apps and stuff and looking at resources. I had so much fun doing it yesterday, it's exciting.*

Darcy indicated in her semi-structured interview and during her lesson that she really struggled with using technology effectively. This was when she did not realise that she could find readers online, but after we spoke the previous day informally, she went home and conducted research on using digital technology to support reading development. She found that books available online which becomes useful to upgrade her reading and comprehension lessons. This showed that although Darcy previously did not know about the different websites and apps, she took the time to go and look for them after she was given more

information on the subject. This demonstrated that she used her agency to locate different sources to use in her lessons.

Kim: *I think you can only go so far in terms of the training because what will happen is people will come, they'll show you how their programme works, and you've now got to bridge that gap between the needs of your school and whatever it is that that programme is bringing. It's never going to be a system that fits all each and every time. There's going to be amendments that you do, and I think it's about working with certain apps or programmes. Okay, this is what I can do with it, this is what I can't. In terms of reading, does it support a range of children, or are we only looking at the middle set? Do they have extension opportunities? Do they have consolidation? That type of thing.*

Kim fully understood that teachers needed to use their agency to make the digital technology available work for their teaching-learning needs. As such, she saw the use of their agency as something that is necessary as all learners have different learning needs. She referred to teacher agency as a quality that bridges the gap between the needs of the class you are teaching and the programme or application suitability which you were given to use. Kim understood the potentials and limitations of digital technology integration in teaching and learning in line with the TPACK model (Koehler et al., 2014; Mishra & Koehler, 2006). Kim acknowledges that training alone is not sufficient for effective implementation of digital technology into education, hence she emphasises the importance of aligning the use of technology with the specific needs of the school and its learners. This contextual recognition of digital technology integration resonates with previous and current literature on the TPACK model. Also, Kim highlights the importance of evaluating technological tools based on their ability to support diverse learners and to provide learners opportunities for extension and consolidation activities. This demonstrates a detailed understanding of PK and CK within the context of technological integration for reading development.

4.5 CONCLUSION

In this chapter, I attempted to answer the question: *What are teachers' perceptions and experiences of using digital technology to support reading development in Grade 1 learning contexts?* I have done so by understanding the teachers' conceptualisations of digital technology by specifically looking at how the teachers defined digital technology and understanding teachers' perceptions of digital technology integration into reading lessons. I then explored teacher efficacy in using digital technology to support reading development by

examining and understanding the training and support that teachers are given to use digital technology effectively, in addition to interrogating teacher agency. In doing so, was able to answer the above question. The teachers in this study generally had a similar definition of what digital technology entails; however, to an extent it was simplistic and limiting. This definition carried through into some of their perceptions of digital technology integration regarding reading lessons. This impacted the way in which they conducted their lessons. The teachers were generally unable to integrate technology correctly into their lessons as they lacked TK, PK and CK as observed in their lessons. It was evident that the teachers lacked training and support in using digital technology as their perceptions, definitions, and practice displayed the lacking understanding digital integration into classroom lessons. Also, the teachers were not very successful in using their agency to learn how to use digital technology. Molla and Nolan (2020, p. 67) state that "strong sense of agency actively seeks learning opportunities". Using digital technology to support reading development was a difficult one for the four teachers.

The next chapter (5) provides the data analysis and discussion of the data derived from the semi-structured interviews and observations to address the second research question: *What challenges do teachers experience when using digital technology to support reading development in Grade 1 learning contexts?*

CHAPTER FIVE

CHALLENGES IN USING DIGITAL TECHNOLOGY TO SUPPORT READING DEVELOPMENT

5.1 INTRODUCTION

This chapter builds on the findings and discussion outlined in chapter 4 to answer the research question: *What are teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts?* In this chapter, I explore the challenges teachers encounter when integrating digital technology into their reading instruction. Specifically, it answers the research question: *What challenges do teachers experience when using digital technology to support reading development in Grade 1 learning contexts?* Together Chapters 4 and 5 present an analysis that explores the aim of the study: *teachers' experiences of using digital technology to support reading development in Grade 1 South African learning contexts.* Also, this chapter discusses the sub-themes related to the challenges (below) experienced when using digital technology to support reading development.

5.2 CLASSROOM MANAGEMENT

Many researchers acknowledge that classroom management is one of the biggest challenges confronting teachers worldwide (Biancarosa & Griffiths, 2012; Dagada, 2022; Geldenhuys & Fataar, 2021; Kalolo, 2019; Singh, 2021; Sobeck & Reister, 2020; Venkatsamy & Hu, 2022). Specifically, the teaching of reading is understood as a mammoth task (Levy, 2009), and the incorporation of digital technology into reading further challenges teachers (An et al., 2021; Brüggemann et al., 2023; Chiu, 2023; Hu & Yu, 2021; Kayalar, 2016; Ramírez-Peña et al., 2022; Segers et al., 2023).

An et al. (2021, p. 2589) explain that the major challenges teachers face "included lack of student participation and engagement, lack of parental support, students without access to technology, concerns about students' wellbeing, no face-to-face interactions with students, no work-life balance, and (difficulties with) learning new technology". However, it is important to note that these challenges were specific to the COVID-19 pandemic, and though it cannot be applied widely, it is about serious challenges concerning the use of technology. Within this study, learners' participation was also an issue such as insufficient access to technological devices, and the lack of face-to-face interaction, among others.

Brüggemann et al. (2023) add challenges that pertain to managing the diverse needs of learners in terms of planning and classroom management, curriculum demands, time constraints, discipline in larger classes, learners with behavioural issues, keeping learners engaged and motivated, parental involvement, and collaboration with teachers, parents and the learner. These are all challenges which have been experienced by Alex, Mpho, Darcy and Kim in different ways as mentioned during the semi-structured interviews and through lesson observations. Hu and Yu (2021) found classroom management challenging, specifically the establishing and maintaining of classroom expectations and rules, the management of disruptive behaviours, engaging and motivating learners to learn, differentiated instruction to meet the diverse needs of learners in the classroom, managing time with the curriculum, and the ancillaries involved in teaching, dealing with conflicts and emotional challenges, and the integration of technology and its challenges. These challenges are not specific to the participant-teachers but are widely experienced globally; however, the specific challenges which teachers face vary depending on the grade they teach, teachers' perceptions, type of school, the subject, and individual learner needs.

Alex explained that while there were no problems with issues of connectivity and loadshedding, power outages and device accessibility were problems that disrupted classroom management. She explained:

Alex: *If you have got 24 kids all with a device and all reading, I can't quite get all of them to listen to them for 30 minutes… If they're each on their own book. But if we are in a group and we're all using the same book... By all means, call them to the front, let's sit, let's do it.*

Alex stated that in the 30-minute lesson, she was unable to listen to all the learners in the class as there were 24 of them, each reading a different book on their individual devices. However, if learners were in smaller groups using the same book, it would be possible to work effectively with them on the devices. This recognition was visible through the TPACK model as Alex noted she would be unable to teach effectively using technology if her learners were together as a whole class; in relation to the TPACK model principles, there is need to consider the pedagogical aspects (PK) of teaching and learning when using technology in the classroom (Mishra et al., 2022). However, as explained in the previous chapter, Alex did a whole class reading activity and was able to effectively implement TK, PK and CK as directed by the TPACK model. Although Alex recognised that a whole class activity with

individual devices might not be a sound pedagogic practice (PK), she suggested that group work makes more sense in a classroom with 24 learners. This shows that she is adaptable and able to manage her classroom in an effective way to overcome the challenges.

Mpho had different challenges regarding classroom management when using digital technology. She explained:

Mpho: *Wi-Fi, load shedding… and that's the thing. You see everything's up, it's connected to the Wi-Fi and all of a sudden, the Wi-Fi dips, and then you have 22 children saying, Mine's not working, mine's not working. So, then your whole lesson goes flat. The same if a device is not charged due to loadshedding, so that's definitely a challenge.*

Mpho faces challenges of connectivity with regards to Wi-Fi due to loadshedding and non-charging of technological devices. However, the school had a backup power and Wi-Fi source, but the 'dip' Mpho refers to is when loadshedding starts and the backup power takes a few minutes to reset the Wi-Fi. This results in a few minutes delay when the learners are unable to connect to the Wi-Fi. During loadshedding the charging of devices is interrupted, thus causing disruptive learner behaviour. These are aspects which are out of the control of the teacher; however, a knowledge of the loadshedding times helps to schedule lessons during normal times, but this is not always possible. Mpho elaborated on her challenges:

Mpho: *Getting to everybody because you've explained what they need to do, but once they go onto that device and something goes wrong… how then, correcting, fixing them all? To me, it's a big challenge. You're one person, and then 22 of them all working on something different. With technology, there's always that chance that it fails you.*

The challenge within Mpho's classroom was 'getting to help everybody' as she was 'one person' teaching 22 learners. She could not get to them all to correct and remediate their errors their classwork, demonstrating that it was a classroom management issue. This issue is noted by An et al. (2021) when the teachers are unable to reach every learner in lesson-time especially when using digital technology for individual classroom tasks, at a different pace, and with different issues which they cannot troubleshoot themselves. The TPACK model underpinning this study requires an intricate balance across the domains (Koehler et al., 2014; Mishra & Koehler, 2006). Mpho was required to use her TK effectively to resolve problems her learners were facing. At the same time her PK is necessary in adapting the method of instruction to ensure that the learning objectives of the lesson are met. Deep CK allows her to change explanations accordingly to support her learners despite the technological challenges

faced. However as explained in the previous chapter, through the lesson observed, Mpho had limited TK and PK.

Darcy explained her challenges regarding classroom management in two ways:

Darcy: *There are so many apps and so many games that can make it fun. But if they don't work that's what frustrates me with technology. If it doesn't work then actually it's more frustrating. Even having TVs in the classroom with load-sheading… I'll plan lesson where I want to show them a YouTube video to introduce a topic. We're talking about rugby and yesterday we wrote stories. We wrote stories about good luck messages to the Springboks. I wanted to play them some videos of other people's videos to just set the mood, set the tone, get the kids excited, and hear what other people have said to wish them luck for the rugby, and I couldn't. So, your lesson falls flat. I can say it all and I read it off my laptop, but I couldn't set the scene. Technology can let you down. That's so disappointing. In the old days, you'd have your pictures and your posters and you'd have it all ready. But I count on technology and then …. Sorry. I was going to show you. That's what I feel I always say to the boys. I was going to show you a YouTube video, but sorry, I can't.*

Darcy found loadshedding to be a big challenge affecting classroom management, as she planned lessons were not delivered due to loadshedding. This was a cause of frustration for her as she felt that the 'lesson fell flat' due to the technology not working because of loadshedding. Similarly, Mpho said: 'then your whole lesson goes flat' when there was a dip in the Wi-Fi due to loadshedding. As such, it was not something new to Darcy as Mpho felt the same way. While in Darcy's school there was backup power and Wi-Fi, the TVs which were newly installed (instead of using a projector) were not connected to the back-up power, thus they were non-functional during loadshedding. This was out of Darcy's control as she could not present the lesson because of loadshedding.

The second challenge regarding classroom management was observed during the lesson when the learners were working on the iPads. 'The power was interrupted by loadshedding, so the Wi-Fi was temporarily disrupted which caused the learners to panic and throw tantrums which the teacher said was what happens when they used technology'. Darcy had difficulty managing the disruptive behaviour of learners which she attributed to the use of technology as she stated that this 'was what happens when they used technology'. Additionally, because she was not working with the learners on the iPads and was working with a different group according to the rotation system, getting to the disruptive learners was hampering working

with her rotation group, thus exacerbating the chaos in the classroom. Darcy's classroom management challenges were not entirely within her control. She did not also demonstrate significant TK and CK as components of the TPACK model (Koehler et al., 2014; Mishra & Koehler, 2006). While working with one rotation group engaged group-guided reading, Darcy faced challenges in managing the disruptive behaviour of learners who were working independently on their iPad's. This hindered her ability to effectively work with the small group, which contributed to a classroom environment that was not conducive for effective teaching and learning. Maintaining effective classroom management is a very important element in the educational space. Sobeck and Reister (2020) found many aspects which are important for classroom management that relate to this study. They claim that effective classroom management can address and prevent challenging learner-behaviours, thus creating an effective and conducive learning environment which allow for better academic engagement; inclusion is an important aspect of classroom management as learners have diverse needs and the teacher needs to effectively accommodate to all of them. Also, the transition between activities that are managed effectively assists in minimising behavioural problems and decreases the time spent transitioning, thus maximising teaching time by having fewer distractions. Further, teachers who are prepared and confident are more proficient at classroom management because they feel more equipped and assured in their teaching practices and are thus less likely to experience anxiety, stress and burnout. However, classroom management issues can arise from various factors, not only from the use of technology, or the lack of TK. The TPACK model stresses the importance of teachers' understanding and balance of using digital technology tools (TK) which can be integrated into content (CK) and the pedagogical knowledge (PK) of the teacher in order for it to be successfully utilised in the teaching-learning process. As such, the challenges which Darcy experienced in the lesson I observed may not be because of her deficiencies in the form of knowledge alone as there may be other factors.

Kim explained her challenges as structural, systemic, and child specific. Loadshedding seemed to be a worrying problem for Mpho, Darcy and Kim. During the semi-structured interview, Kim explained that they previously had desktops which were replaced with Chromebooks. Kim explained:

Kim: *The systemic one, in terms of loadshedding. So now, I can continue my lesson, and we're fortunate that we have backup Wi-Fi and power, but that too doesn't last forever. So, there'll be times when it's a really long, it's a four and a half hour or even more, then that Wi-*

Fi goes away, and it's a Chromebook, it needs Wi-Fi to function, then I'm done. Now we're going back to gaming on the iPad or on the Chromebook, which is not part of the actual lesson.

The use of Chromebooks allows Kim to continue her lesson as the school has backup Wi-Fi and power. Previously the desktops were not connected to the backup power. However, long periods of loadshedding meant that the Wi-Fi does not last long after charging. Chromebooks need Wi-Fi to function. Mpho thus uses the Chromebook or the iPad without Wi-Fi for gaming which is not part of the actual lesson. While Kim plans a lesson by using TK, PK and CK, the TK may not work due to challenges which are out of her control. She explained that when the Wi-Fi is drained after a long period of loadshedding, the digital technology reverts to offline gaming on devices, which was not what she planned to do during the lesson.

Kim found monitoring to be a difficult aspect within classroom management when using digital technology. This was similar to what Alex and Mpho experienced where there is the teacher and sometimes teaching assistant who are in the class struggling with 22-24 learners and have to work with them all together. She explained:

Kim: *When a class comes in, and the stages of development are so varied. It's okay, you can have a seat where you're extending, and they're at the top, middle bunch, and a couple at the bottom. But the moment you've get the gaps that are too big, it's hard to find activities that cater to all of them. So, what happens is, those two people that are in the classroom are now working with kids, 12 kids that are doing 12 different things. And that's hard to monitor, because if we're at least all doing the same app… even if we're at different levels of that app, I can go back; this is how you go forward, this is how you manoeuvre. If we're all on different things, it needs me to up my game.*

Kim found that the gaps between the top, middle and bottom groups are too varied, so it becomes ‘hard to monitor’ as the learners are doing ‘different things’, which requires Kim to be ‘up her game’. This was understood as a challenge by Alex and Mpho, while Kim was fortunate to have a teaching assistant with her in the classroom to help her with learners’ queries. The large gaps between the groups made it ‘hard to find activities that cater for all of them’. Kim stated that when the gaps are small, the ability groups can work on the same app but at different levels. Thus, when correcting the learners, she can do it collectively, as it is about the same application and activities - just different difficulties according to the ability of the group which is in line with the TPACK model (Koehler et al., 2014; Mishra & Koehler,

2006). Kim is required to have significant TK to address the varying levels of learner development, integration of PK to use appropriate instructional strategies to cater for individual needs, and CK to understand what needs to be taught.

In terms of classroom management, the teachers faced challenges. Most of the problems were loadshedding-related which affected Wi-Fi connectivity - and thus smooth lesson delivery. Kgarose, Makhubele and Setaise (2024, p. 87) posed a question to HEIs (Higher Education Institutions) regarding the issue of loadshedding: "Is loadshedding another Pandemic?" suggesting that it is a problem across the board from primary to tertiary education. This problem was included as "Students are required to attend classes and write assessments using digital platforms, but the electrical crisis has prevented e-learning from properly achieving its goal" showing that this is a general problem in education (Kgarose et al., 2024, p. 88). This was followed by challenges of monitoring, correcting classwork, and assisting all learners in the class which the teachers found to be difficult when using technological devices. The use of digital technology in the educational space according to Sobeck and Reister (2020) comes with challenges as teachers are given the task of monitoring and correcting learners work in a non-traditional manner, and this integration of technology into the teaching process increases the complexity of teaching. Additionally, the use of devices needs constant vigilance to ensure that the learners are actually using it for the purpose of learning and specifically on the content (CK) being taught.

Digital technology in the classroom brings new dynamics to classroom management. This includes issues of infrastructure, loadshedding, and the ability of the teachers to monitor and provide individual assistance during lessons. Broader research on educational technology literature and classroom experience reports that in places where there are Wi-Fi disruptions because of loadshedding or electricity supply issues, teaching-learning can be severely hindered (Raza et al., 2023; Streatfeild, 2018).

5.3 BALANCING BOOKS AND SCREENS

The idea of balancing books and screens is understood in two ways. The first is finding the right mix of using traditional learning resources and digital technology, while the second is managing to meet the demands of the curriculum including integrating digital technology into teaching (DBE, 2021).

Alex explained that in Grade 1, the focus of learning is on core skills such as preparing learners to read and write. Digital technology implementation, according to her experience, could be better implemented once learners master such skills. She explained:

Alex: *Grade 1 is a busy year. It's a hectic year and we have to teach them how to read and write. It would probably be easier to implement a digital programme once they are already reading to improve other skills. I think you can, but I think it would be tricky to find the time to do it.*

Alex found Grade 1 to be 'hectic' as teachers needed to teach learners how to read and write. As such, she found that it would be difficult to find the time to use digital technology in lessons; it would probably be easier to implement a digital programme once they are already reading to improve other skills. This refers to the balancing books and screens to meet the demands of the Grade 1 curriculum. As a result, digital technology use and integration takes a backseat as the time is limited and the learners need to be able to read and write before the end of Grade 1. Alex demonstrated CK and PK as she was aware of the learning objectives that needed to be attained, and the strategies on how to achieve them. She does not demonstrate TK effectively as reading and writing can be supported by integrating digital technology into lessons; they should not be seen as completely separate entities. A teacher who is proficient in TK within the TPACK framework would find a way to integrate digital technology tools to support reading and writing rather than having them as isolated entities - they can be used together. Thus the TPACK model was not effectively comprehended by Alex. The research by Baron (2017, 2021), Chiu (2023) and Ingram (2020) on the use of e-books and digital devices for reading as well as the value of having both print and digital texts, emphasise the importance of blending traditional sources with digital technologies to enhance learning and education as a whole which is essentially the aim of the TPACK model.

Mpho like Alex, referred to the second idea of balancing books and screens where teachers have to manage meeting the demands of the curriculum while also integrating digital technology into teaching. She explained:

Mpho: *Our day is so busy. We have such little contact time. We want them to be writing in a book, reading in a real book, which we have the resources for. We don't use the digital technology a lot.*

The challenge described by Mpho regarding limited contact time and a preference for traditional resources over digital technology can be analysed through the TPACK model. This

sheds light on Mpho's focus on CK as she prioritises writing and reading as foundational literacy skills. Hence, PK is recommended as she finds hands-on and tactile learning experiences for Grade 1 learners to be more effective than digital alternatives. Since, TK is not signalled, Mpho who acknowledges the advantage of digital technology may lack confidence in using digital tools to support reading development. Mpho elaborated:

Mpho: *Grade 1 being the foundation, we were teaching them to read and write. Well, holding the pencil, writing, just working in lines. For me, technology takes a back seat within the classroom, because those core skills are more important. Because if we, in Grade 1, don't teach them how to sit on a chair properly, how to sit at a table and write. Because when they take an iPad, you'll see, they're lying on the carpet. Your posture's not there, you need to get that in place first…But it has its place, where you're trying to do those core skills first, and then take them from there.*

This showed that the act of balancing the requirements of the curriculum – teaching them to read and write and curriculum matters are perceived as more important than the use and integration of digital technology into reading lessons. Mpho believed that digital technology 'has its place' but only after 'core skills' are mastered can digital technology be integrated in lessons. This does not indicate knowledge about how technology can be used to support the development of these core skills, thus demonstrating a lack of TK (Koehler et al., 2014; P. Mishra & Koehler, 2006).

Darcy referred to the both sides of the challenge of balancing books and screens. She understood the balancing books and screens where teachers need to manage meeting the demands of the curriculum while also integrating digital technology into teaching. This was interesting as she contended that Grade 1 is more than just about learning core skills. She explained:

Darcy: *I still think there'll be a space for this early development where they need a nurturing teacher, and they need her because it it's not all about learning. I mean, it's about blowing their noses, making sure someone's eat lunch. So no, I don't think it'll replace. I think they'll always still need that.*

This explanation said that in Grade 1 there is a need for 'a nurturing teacher' because learners need help 'blowing their nose' and 'making sure they eat their lunch', which extends beyond the curriculum. Darcy said 'it's not all about learning', acknowledging that there are aspects which extend beyond the curriculum demands. This does not show TK, PK or CK, but

reveals that Darcy has an understanding of her value in the classroom beyond the requirements of teaching. She also referred to the balancing books and screens as finding the right mix of using traditional learning resources and modern trends. She added:

Darcy: *I think it's something really great and I would be excited to have that extra hand in the classroom. And I think technology can be that extra hand, to go get the iPads. You can go and do this. And I think it would be amazing. I really do.*

The above evidence by Darcy proves that technology can be balanced with traditional learning resources as she viewed it as a tool which can be an 'extra hand in the classroom'. While this is not necessarily how digital technology is understood, it is an interesting interpretation of how she found it would be possible to balance traditional learning resources with digital technology. This shows that she has an understanding of TK and CK, although not explicitly stated. Her PK may be limited as she referred to digital tools as 'extra hands'.

Kim understood the idea of balancing books and screens as managing meeting the demands of the curriculum while also integrating digital technology into teaching. This was different to other teachers' understanding of balancing books and screens. Kim found that technology integration allowed the learners to extend themselves academically, despite their Grade 1 level. This was explained by Kim:

Kim: *What technology allows you to do in a digital space is you can use the microphone. And I can speak to the microphone, and it can type certain things out for me... That gap is seen very quickly, whereas children become a tad smarter here and go, okay, what are some of the things that can aid me to match my peers.*

Kim sees technology as a tool to get learners to meet the demands of the curriculum by getting learners to 'match their peers' by allowing them access to parts of the lesson they would not necessarily have access to with only traditional resources. This was explained as digital technology allowing learners who are unable to spell something. This allows learners who know and understand words to use them in sentences even when they cannot spell them. This allows underperforming learners to gain spelling skills to match their peers who are doing successfully what is required as per the curriculum. This shows that Kim has significant TK, an understanding of CK, and the PK to teach in a way such that all learners can easily access the information, thus demonstrating her understanding of the TPACK model.

5.4 THE EMOTIONAL LABOUR OF USING DIGITAL TECHNOLOGY TO SUPPORT READING DEVELOPMENT

Fernández-Batanero et al. (2021, p. 1) in their research explain that "teachers present high levels of anxiety or stress due to their use of educational technology in the classroom". They acknowledge that digital technology has transformed the way in which we work, live, our relationships both personal and professional, but the use of it alters the lives of its user and transports them the 4IR era (Fernández-Batanero et al., 2021; Schwab, 2017). However, Fernández-Batanero et al. (2021) assert that the use of digital technology is not suitable in all spheres of life as it causes disruptions within personal and interpersonal relationships, affects health, and becomes a source of tension manifesting into anxiety. They understand that this is because there is such a demand to include digital technology into education, "despite the lack of technical resources and equipment necessary for its correct didactic use" (Fernández-Batanero et al., 2021, p. 1). This can be understood to a certain extent in this study - teachers had access to technological resources, but they lacked training which forced them to use their agency to overcome challenges.

Alex understood that when she had a challenge using technology in her teaching, it caused the learners to behave in disruptive ways. She explained:

Alex: *They get noisy, frustrated and irritated as kids do. But that's also if I'm not using reading technology. If you don't have enough books, they will say, why don't I get it, why do I have to share, why! So, I think they get frustrated, irritated, snappy, the normal…*

This indicated that while learners were becoming 'noisy, frustrated and irritated' Alex was experiencing technological challenges. She noted, however, that this was not a unique challenge regarding the use of digital technology as learners have to share books which Alex described as 'the normal'. While these challenges are emotionally draining on the teacher, they extend beyond the use of digital technology. Alex did note that it does emotionally affect her as enunciated below:

Alex: *Am I allowed to say we're just used to it because you taught us for a long time? Let's have a brain break, let's refocus, let's breathe, let's get back to where we are, let's ground. I mean, we do all these things to help them too.*

Fernández-Batanero et al. (2021) explained that teachers experience high levels of anxiety due to their use of digital technology especially when learning how to integrate it. Alex mentioned solutions to reduce anxiety and lower the risk of panic attacks and burnout. This

prompted me to ask the teacher about how the children's emotions (frustration, irritation, and snappiness) affected her emotionally. The emotional labour in this case pertains to how Alex constantly manages her own stress, anxiety, emotions, as well as the learners to respond appropriately to questions. Bodenheimer and Shuster (2020) identify the effects of teachers' emotions, stress, and anxiety in being able to manage their own personal emotions but also the emotions of their learners. This emphasises that teachers carry a large emotional burden which can lead to burnout if not managed properly. Teachers must adapt to manage their stress in educational settings by planning and constantly learning about remedies to circumvent challenges (Bodenheimer & Shuster, 2020). It also shows that Alex is emotionally resilient despite the odds she is facing in her day-to-day life. As teaching is an emotionally draining profession, the addition of digital technology to their job-description increases their stress and anxiety (Fernández-Batanero et al., 2021). Alex sees the brain break, focus, exercise, and breathing as remedies which help her and the learners to get back-on-task after experiencing a challenge when using digital technology. She added:

Alex: *The less you use it (technology), the better they (learners) are. I feel like their mood changes. But I feel like we have happier days (*when there's less screen time).

This feeling is understood by Hu and Yu (2021) who state that younger learners are full of energy and require tactile experiences which develop them holistically, thus working on a screen does not do that, rather it overstimulates them causing mood changes which range from sadness to anger and depression. Alex noted:

Alex: *I feel like it excites them definitely to get a device because they're used to it and it's something that is not the norm or something different. But I do feel like once they're done with it, some of them are grumpy, irritable, as they didn't get to finish it because you'll warn them about the time left. Learners ask why couldn't I finish the game, and I wanted to finish the game, and I only got three stars but she got five stars. I feel like that sometimes this does not happen when you are using a hardcopy book because you're all the time chatting about the book.*

Alex needs to manage learners' emotions to deal with their frustrations, and ensure that they are meaningfully engaged in learning, among others - a laborious task. Alex adds that the use of digital technology causes the learners to become grumpy and irritable for different reasons. She also compares working digitally with working with traditional sources. She observed that despite giving time warnings to finish a task digitally, the learners get upset when they do not

finish the task, but this does not happen when using non-digital tools. The reason for this, according to Baron (2021) was that reading digitally causes learner-frustration. Baron (2017) explained that reading digitally involved multitasking as learners are required to switch between tabs and deal with pop-up notifications which disrupt the learner's deep concentration and comprehension when reading. Reading digitally lacks the tactile and sensory experience of traditional books making it even more difficult for some learners to engage deeply with the material. This was elaborated on by Baron (2021) who exposed that learners get screen fatigue which comes from prolonged periods of reading on a digital device. This can also lead to eye-strain and mental exhaustion which diminishes the reading experience. The combination of these factors, among others, contributes to learner-frustration when reading digitally.

Regarding the use of digital technology in the classroom for reading development, Alex asserted:

Alex: *I, 100%, as a Grade 1 teacher, would not recommend using it. The less screen time for me, the better. There are things that they can do on there that are fun and informative and wonderful, but I feel like that is in terms of reading and literacy, I feel like they get far more from using actual flashcards, from playing actual bingo. Also, I feel like when they have the tablet, they have no social interaction. It's them and you can call them three times or more times until you give up. Whereas if you call them without the device, they tend to turn to look at you a little, bit more easily.*

This is the second time that Alex indicated a negative attitude towards digital technology being used in the classroom. Alex is taking an emotional stance here but is firm in her belief. This could have been due to her lack of training or the burden of emotional labour involved in using digital technology for reading development. She elaborated:

Alex: *I didn't know how they socially interact with each other. They don't even know how to deal with conflict. Like, they have no conflict-resolution skills. And it's instant gratification. I got it right, where's my star? I need it now. They want a reward instantly because that's what the tablets give you... And there's nothing like learning from your friends. There's nothing like coming to the front of the classroom and sounding out your spelling words or playing Hangman. I'm talking about literacy games. And that's how they learn through games and fun and not always digitally.*

Alex recognised that digital technology took away aspects of social interactions and conflict resolution, aspects which are key in young learners' development. She found that the use of digital technology creates an expectation of instant gratification in the form of stars which is not possible when teaching without it. Alex found that her learners 'learn through games and fun and not always digitally', which indicates that Alex does not have as much TK, CK and PK as previously realised as she does not recognise that digital gamification for learning is still learning. As Alex talks about the lack of social interaction, instant gratification mentality, and lack of conflict resolution skills arising from too much digital exposure, it implies that she did not fully realise the pedagogical potential that technology has to offer for supporting reading development. It is important to note here (below) that when asked about the frequency of use of digital technology Alex said:

Alex: *Let's just be honest here. Let's say we didn't really do anything for Term 1 and 2, but this term at least once a week…I use digital books to show them during a story lesson…That is almost twice a week at least. We also do phonics games to help with our reading, and they're also online…We do use digital technology for discovery learning, when we use lots of videos. We do for art as well. We use Draw So Cute to teach children spatial orientation when they're drawing a picture, and we do use it for some sort of counting but not that often. Not that often with mathematics, the rest we do… I use it for handwriting as well.*

Alex stated contradictory opinions. This contradiction related to her aversion to the use of digital technology use in the classroom, but she was dependent on her laptop for information:

Alex: If I forget my laptop I'd be in trouble… I wouldn't be in trouble for like the day but it would be tough if somebody asked you something and you wanted to show it to them.

This shows that while Alex claims to use digital technology 'at least once a week', her other statements indicate that she actually uses it quite frequently than she recognises or admits. This shows that Alex has a form of ambivalence towards the use of digital technology; this could be due to her lack of training, her perception of digital technology in education, or the emotional labour which drains her when she uses digital technology in the classroom (Jannah et al., 2020; Spiteri & Chang Rundgren, 2020). However, the challenges and complexities which teachers face, as evident from Alex's contradiction and ambivalence, show that there is a need to carefully navigate personal attitudes and professional requirements. Henderson and Milman (2020) discuss how important it is to address teachers' beliefs and attitudes towards technology integration in order to effectively support their professional development in this

area, and manage their emotions within the educational setting. Kilag et al. (2023) explain that the emotional labour involved in managing the emotions and tensions between learners, the teachers' personal beliefs and understandings on digital technology use, and the demands of digital integration in the educational context is a great challenge. This sheds light on the many different strategies which teachers, including Alex, face when navigating challenges while maintaining their social and emotional wellbeing and their effectiveness as teachers. Mishra et al. (2022) claim that "Integration of technological pedagogical content knowledge (TPACK) in classrooms through a teacher's lens" provides insight into the evolving nature of the TPACK model and its implications for teachers, their attitudes, practices and the implied emotional aspect of technology use. This contributes to a deeper understanding of the emotional and professional challenges associated with incorporating digital technology into the teaching and learning in educational settings.

Mpho had a different view on the emotional labour of using digital technology to support reading development. She stated:

Mpho: *I'm not won over by it because I think the children have too much technology than they need. Also, when they're working by themselves, you're not the one checking to see if they doing it correctly. Because often if they…work on it, they just do anything and give it back and they're done in the technology, because then where they're not getting that, if a teacher is working or if it's on a whiteboard and you're checking, you're walking around and it's easier for you to say, All right, fix that up. There's that more instant correction in a sense from a teacher.*

Mpho was not 'won over' by digital technology because of three reasons: first, she found that learners used digital technology too much out of school; second, she found that when they worked with technology they were working by themselves with no checking to see if they were doing tasks correctly; and third, she found that when she worked with learners using more traditional teaching resources, she was able to walk around and check - there was more instant feedback from the teacher. This shows that Mpho's TK was lacking as she did not necessarily know the best ways to use digital technology to support her CK and PK (Koehler et al., 2014; P. Mishra & Koehler, 2006).

Darcy did not explain the challenges she faced with regards to the emotional labour of using digital technology during her lessons. She did however state:

Darcy: *If the technology doesn't work, then it becomes a hindrance and a burden.*

This statement indicates that Darcy has some experience with digital technology but was not confident in using it for fear of the repercussions of it not operating during power outages, among others. This is understood by Fernández-Batanero et al. (2021) who recognise that technological tools have the capacity to invoke anxiety and stress in the user especially when they are not well acquainted with it, and have had many negative experiences using it. As such, it can become a hindrance and a burden for the teacher because it puts a further strain on the teaching-learning process.

During the lesson I observed that the emotional labour of using digital technology was draining during the rotation of groups because of time constraints in the use of digital devices. This showed that the learners were experiencing emotional challenges which impacted on the teacher who had to deal with their whining and complaining. When power was interrupted during the lesson, temporarily stopping the Wi-Fi, it caused the learners to panic and throw tantrums. Additionally, a learner threw the iPad onto the floor when the application was blocking access via the login process. Darcy attempted to provide a solution when learners displayed emotional outbursts and challenging behaviours buy she struggled to implement them effectively. This suggested that the learners were facing emotional challenges which impacted on the way in which Darcy used digital technology. This shows that using digital technology was emotionally challenging for learners as well as the teacher which originated from using technology in reading lessons. This may have also been due to a lack of knowledge on effective pedagogical strategies as Darcy was not prepared pedagogically.

Darcy's reluctance to use digital technology suggests that the emotional labour in using it outweighed the benefits, given the problems it caused when it was used. This also indicated that she had limited TK, CK, and PK to teach via the use of digital technology.

Kim did not find the use of digital technology to be emotionally laborious; however, she did note two aspects which she found to negatively impact on the emotions of teachers regarding the way they perceived digital technology as a teaching-learning tool. The first was:

Kim: *To go out and find the apps that work for you…It's time-consuming as you've got to go through so much… You spend half the day trying to find the apps, and then the other half trying to troubleshoot - it's not worth my time.*

Finding the appropriate application or website to use in accordance with the relevant CK required and a way which aligns with the PK, was a challenge which takes a long time and involves troubleshooting - finding out how to use the TK and ensuring that learners are able to cope with the tasks. This resulted in teachers not seeing the benefit of digital technology and regarded it as not worth their time. In other words, they spent more time finding the appropriate technological tool to use and figuring out how to use it; by the time they actually used, they were exhausted. This shows how teachers find the process of using digital technology 'time consuming' as there is so much to get through to actually use it effectively, hence they do not see it as something worth their time. Kim explains the second aspect which relates to the emotional labour of teachers:

Kim: *Teachers work really hard but they don't work smart. And that is a problem. And they feel the frustration because they go every afternoon saying I'm into my classroom, I'm doing this. Why? Just put it on Google Classroom. Let them do it there. That's where they can do the assessment. It will mark it all for you within five minutes and you're done. But here you are spending an entire afternoon. So, we work hard, not smart, and that kind of digital space can really help us out.*

Kim sees that teachers work really hard and contribute to their emotional labour of teaching but says that 'they don't work smart'. The reason for this is that teachers can use digital technology to help them to perform tasks which are time-consuming that cause them to feel frustration. She explained that teachers spend entire afternoons marking assessments which could have been put onto Google Classroom and it would mark for you. Teachers are emotionally and physically exhausted and frustrated, but do not see that digital technology is actually something which can assist them in their tasks. The teachers lack TK and therefore do not know how it can be used in teaching, learning, and assessments (Koehler et al., 2014; P. Mishra & Koehler, 2006).

5.5 CONCLUSION

This chapter presented the challenges of using digital technology to support reading development. This chapter together with the previous one (4) assisted to answer the research question: *What are teachers' perceptions and experiences of using digital technology to support reading development in Grade 1 learning contexts?* In this chapter (5) I answered the research question: *What challenges do teachers experience when using digital technology to support reading development in Grade 1 learning contexts?* It was significant for the study as

it engendered fresh insights and understandings of teachers who used digital technology which was crucial to answer the last research question.

In chapter 6, I address the last research question: *How do Grade 1 teachers' experiences of utilising digital technology to facilitate reading development in their classrooms lead to the emergence of new insights and understandings?*

CHAPTER SIX

SUMMARIES, REFLECTIONS, FINDINGS, LIMITATIONS, AND RECOMMENDATIONS

6.1 INTRODUCTION

In this chapter, I considered the research question: How do Grade 1 teachers' experiences of utilising digital technology to facilitate reading development in their classrooms lead to the emergence of new insights and understandings? To achieve this, I examined teachers' experiences of using digital technology to support reading development, by highlighting the insights and understandings that emerged from the analysis of the data.

Digital technology is becoming increasingly relevant in the 4IR era and this has increased recognition among those doing research, teachers, theorists and policymakers as is evident from the amendment to the CAPS document (DBE, 2021). This shows that the introduction and use of digital technology has become more accessible in schools. This study aimed at exploring teachers' experiences of using digital technology to support reading development in Grade 1 South African learning contexts. My research focused on the use of digital technology as a whole, and as a teaching and learning tool to support reading development. The research showed that while many teachers have a positive experience of using digital technology, others have a negative experience. These experiences in turn impact on the use of technology and its effectiveness. Thus, this study explained teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts. This is supported by literature which argues for and against its use by including the challenges which teachers face in its usage it.

This chapter first provides an outline of each of the chapters, then restates the research problem, and then focuses on the research questions. Thereafter I reflect on the TPACK model which served as the theoretical framework for the study, after which I discuss the research methodology by evaluating its effectiveness within the context of this study. A summary of the key findings in relation to the first two research questions is also presented. The new insights and understandings which emerged from the data analysis from chapter four and 5 are explained. The implications of this study for the field of education are also outlined. The limitations of the study are discussed in depth. This led to proposing recommendations and directions for future research. Finally, the conclusion to the whole study is presented.

6.2 OUTLINE OF THE CHAPTERS

Chapter 1 - Introduction: The chapter provided the important and necessary foundation to frame this study. This provided the reader with the outline of the background of the study, the rationale, the problem statement, research aim, research objectives, research questions, and a succinct literature review. Thereafter, the theoretical framework and methodology was outlined. This was followed by briefly stating ethical considerations, trustworthiness, and the limitations of the study.

Chapter 2 - Literature Review: this chapter focused on the understanding, application and use of digital technology as a reading support tool, and teachers' perceptions of its use. This was done by reviewing the South African reading context, digital technology as a tool to support reading development, teacher agency, teachers' perceptions of digital technology, and the factors that influence the effective implementation of digital technology in classrooms. The literature review was guided by the research questions. South African research on the topic was limited. Additionally, the TPACK model which was the theoretical framework underpinning this study was explained, and its application to this research study was reviewed.

Chapter 3 - Methodology: This chapter presented an overview of the research methodology employed in this study. This allowed me to understand the interpretivism paradigm which was the chosen research philosophy. The qualitative research methodology was aligned with the interpretivist paradigm. The research design which formed the blueprint for the study used a multiple case study to develop a comprehensive understanding of the intricacies of using digital technology to support reading development in Grade 1 learning contexts. The research context and sample were also mentioned. The methods of data generation were briefly explained. Semi-structured interviews with each teacher and lesson observations involving them were explained. The thematic analysis approach to analyse the data using the 6 steps outlined by Braun and Clarke (2006) was applied. Three main themes emanated from the collected data. Reflexivity was described within the context of the study with regards to myself as the researcher. Trustworthiness was explained in detail. Then the ethical procedures which were adhered were outlined. Lastly, the limitations of the research were explained.

Chapter 4 - Teacher's conceptualisations and efficacy with technology for reading development: This chapter's purpose was to answer the research question: What are teachers' perceptions and experiences of using digital technology to support reading development in

Grade 1 learning contexts? It provided an in-depth discussion of teacher's conceptualisations of digital technology and teacher efficacy in using digital technology to support reading development; two of the three themes were dissected in this chapter. The key findings which emerged from this chapter was that all teachers had different perceptions of digital technology which were influenced by various factors which impacted on their experiences of using digital technology to support reading development in Grade 1 learning contexts.

Chapter 5 – this chapter exposed the challenges of using digital technology to support reading development. The purpose of this chapter was to answer the research question: What challenges do teachers experience when using digital technology to support reading development in Grade 1 learning contexts? Also, an in-depth discussion on the three sub-themes explained the challenges in using digital technology to support reading development. Key findings emerged from this chapter which centred on challenges when using digital technology to support reading development; these were categorised into sub-themes which defined the challenges as classroom management, balancing books and screens, and the emotional labour of using digital technology to support reading development.

6.3 REVISITING THE RESEARCH PROBLEM, AIM, AND QUESTIONS

The research problem arose from the reading crisis in SA, and with the technological movement precipitated by the Fourth Industrial Revolution (4IR). As digital technologies became increasingly integrated into various aspects of society including education, I deemed it important to explore their potential role in addressing the reading crisis in FP classrooms (Grade 1). By exploring how teachers were leveraging digital tools and resources to enhance reading development at this beginning of reading stage, it was anticipated that insights could be gained into the potential of technology integration to help overcome the challenges posed by the reading crisis.

To explore my research aim of Grade 1 teachers' experiences of integrating digital technology into reading development, I used three guiding research questions 9see chapter 1):

These questions were designed to access an incisive understanding of teachers' real-world experiences, the complexities and challenges they experienced when integrating digital tools, and the resources utilised for reading instruction in Grade 1 learning contexts. The insights and new understandings emerged from the exploration of both their experiences of using digital technology to support reading development (first research question), and the

challenges they faced when integrating digital technology into their reading instruction practices (second question).

6.4 REFLECTION: THEORETICAL FRAMEWORK

The Technological Pedagogical Content Knowledge (TPACK) model, initially developed by Mishra and Koehler (2006), served as the theoretical framework for this study. I firstly introduced this theoretical framework in chapter one, and then elaborated on it in chapter two. The TPACK model served as a blueprint for understanding how to effectively integrate digital technology into teaching practices. Given the focus of this study on teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts, the TPACK model was an appropriate choice as it specifically addresses the intertwining between technology, pedagogy, and content knowledge.

By using the TPACK model as the theoretical framework, I was able to analyse and interpret the generated data to answer the three research questions. The model's emphasis on the intersection between technological knowledge, pedagogical knowledge, and content knowledge aligned with my study's aim of exploring teachers' experiences, challenges, and emerging insights related to the integration of digital technology within Grade 1 reading contexts.

The TPACK model is in alignment with the interpretivist paradigm. As explained by Cohen et al. (2018), interpretivism is categorised by the concern to understand the experiences of the human world. The interpretivist needs to understand the social phenomenon through meanings and interpretations which show how the TPACK model can play a vital role in how teachers, educators, and researchers approach technology integration in schools. Within the interpretivist paradigm, the TPACK model aligns with the notion that teaching is a complex and socially-situated action within the attempts to co-construct knowledge. Teachers who apply the TPACK model also recognise the diverse content being taught through using technology as a tool. This acknowledges that the effective integration of technology into teaching practices requires sensitivity towards learners' needs, inclusivity, and contextual awareness. The TPACK models' user is required to reflect on the dynamic relationship which exists between technology, content and pedagogy which encourages an all-inclusive and comprehensive understanding of teaching-learning within the interpretivist paradigm (Mishra & Koehler, 2006).

The TPACK model's application was an effective way to understand teacher-experiences of using digital technology to support reading development in Grade 1 learning contexts. It allowed me to dissect the data despite its enigmatic nature. The study revealed that while many teachers possessed TK, despite it being limited in most cases, they were unable to integrate it effectively into pedagogy - they could do one, but not both. Additionally, some of the teachers' TK was limited due to contextual factors. The teachers' use of technology to support reading development was weakened as most did not demonstrate TPACK principles. Since the schools were technology-resourced, TPACK was expected from all teachers at the private schools (Mishra et al., 2022; Mishra & Koehler, 2006).

6.5 REFLECTION: RESEARCH METHODOLOGY

In line with the interpretivist paradigm, this empirical research study emphasised teachers' experiences in order to understand what influenced their beliefs and practices within the Grade 1 learning context. The qualitative research methodology was selected as an approach in alignment with the interpretivist paradigm being suitable to answer the research questions of the study. The qualitative approach was considered as the most appropriate to understand teachers' experiences of using digital technology to support reading development in Grade 1 learning contexts. Since the study engaged four teachers, a multiple case study design was suitable and thus chosen to understand teachers' experiences, beliefs, and perceptions of using digital technology to support reading development in their Grade 1 learning contexts. This was done by conducting semi-structured interviews and classroom observations. These approaches were carefully selected to encourage teachers to share their beliefs and discuss their experiences of implementing digital technology to support reading development.

Regarding the semi-structured interviews, the objective was to understand teachers' experiences of using digital technology to support reading development in their Grade 1 learning contexts. This was executed through a series of questions in four categories: biographical, teachers' understandings of how digital technology can support reading, using digital technology in the classroom, and challenges and opportunities. The teachers described the types of digital technological devices available (resources) including apps and software employed in their respective schools. They described the way in which they used digital technology in their teaching to support reading development. They also described the challenges confronted when using digital technology, and the factors which influenced such challenges in each of their Grade 1 contexts. Each teacher's lesson was observed to measure

the extent and efficacy of using digital technology to support reading development. The teachers' in-depth responses together with aspects that were observed during lesson-delivery answered contributed to answering the research questions. The research context was chosen by using criterion sampling such that access to various forms of digital technology, adequate infrastructure and resources to support technology use, and prescribed timeframes for using technology in classes were evident at these schools which were located in Johannesburg, Gauteng (RSA). However, the responses elicited from the four teachers fell within a category not necessarily accessible to all groups in SA.

The research methodology was not adapted but was applied as prescribed; however, it took longer than anticipated to actually generate the data from the schools due to ethical approval which took longer than expected, school closure, and teachers' crowded schedules. The generated data was analysed using the six steps outlined by Braun and Clarke (2006) while keeping in mind the TPACK model underpinning this study. The six-step process was one which was time-consuming and complicated due to the data being voluminous, and the contradictions between literature and data within the data itself. The research process allowed the data to be organised and refined, and themes which were suitable for the research study as a whole were chosen. The strengths in the design of the study were that I was able to make a comparison between the teacher's pedagogy and practice, the semi-structured interview, and the observation. The research design allowed for triangulation as I was able to test for validity through the convergence of data from the semi-structured interviews and observations. The research methodology was effective within the context of the study. However, it could be improved on by other researchers in the field by doing more than one classroom observation session - at least three to four classroom observations per teacher. Additionally, it could be improved by interviewing more teachers in a wider area. Lastly, an improvement on the availability of more and better software to create the themes would be advantageous to save time in generating them.

6.6 KEY FINDINGS

6.6.1 Key Findings Emanating from the Answers to the Research Questions

The first research question: *What are teachers' perceptions and experiences of using digital technology to support reading development in Grade 1 learning contexts* was answered in chapter four through discussing the two themes in which the key findings were summarised (Table 6.1 below).

Table 6.1: key findings from Question 1

Theme	Key Findings
Theme 1- Teacher's conceptualisation of digital technology	All the teachers had some technological knowledge, including that of the different digital technology products, their use, and functions, and how they can be integrated into the teaching of reading. They were all able to describe digital technology. The difference was lay within their depth of technological knowledge and their specific definitions of digital technology. This difference in depth impacted on their perceptions.
	The teachers' perceptions of digital technology integration into reading lessons varied. This was anticipated as stated above. All the teachers saw some value in using digital technology, but not to a great extent. Unknowingly they were actually using a form of digital technology. The teachers saw digital technology as a means to practising something already learned. The teachers did not all see, understand or perceive how to integrate reading with digital technology. The teachers' responses during the semi-structured interviews did not always correspond with their practice regarding the lessons which I observed. However, since it was only one lesson, major conclusions cannot be drawn. The teachers' perceptions of digital technology to a limited extent influenced their practice. However, there was no correlation between a positive perception of digital technology and effective integration.
Theme 2 - Teacher efficacy in using digital technology to support reading development	All the teachers did not have formal training in using digital technology. This explains why the teachers had challenges in the execution of their lessons which even explains some of their responses during the semi-structured interviews. The teachers were not really supported by their schools in the way they needed to be or expected to be. Although digital technology was expected to be used by teachers in different forms, teachers were not formally trained on using it, and specifically on using it to integrate content with pedagogy. The teachers had collegial support - they supported each other to an extent by offering advice on using certain apps or sharing

	something which was relevant to the content they were teaching. There was a mix in support from parents concerning the use of digital technology, both at home and at school. The lack of training and support to use digital technology was evident in all the teachers' practice.
	Hence, teachers applied their agency to use digital technology accessed from apps, websites, and other ICT sources to integrate it into their teaching.

The teachers all had different perceptions of digital technology which was instilled by their different understandings and conceptualisations of it. As such, their perceptions and experiences of using digital technology to support reading development in Grade 1 learning contexts varied, were not effective, neither efficient nor clear. It was due to the lack of training and support in using digital technology as a support tool.

The second research question: *What challenges do teachers experience when using digital technology to support reading development in Grade 1 learning contexts* was answered in chapter five by the one theme in which the key findings are summarised in Table 6.2 below.

Table 6.2: Key findings from Question 2

Theme	Key findings
Theme 3 - Challenges in using digital technology to support reading development	Classroom management was a challenge which all the teachers experienced in different degrees. Many found that loadshedding was a problem which impacted their classroom management strategies. Despite the schools having backup power for Wi-Fi systems, the interval between the power outage and the time it returns causes many problems which affect teachers' classroom management. Another challenge was managing and supporting 22-24 learners who were working on devices. Also, teachers had to ensure that the learners were using the digital device for its intended purpose in relation to the content being taught. This was because of the different stages of development of learners which meant that on some apps, the activities they will do will be very different to that of other learners.
	The idea of balancing books and screens was also a challenge for

	teachers. This was either finding the right mix of using traditional learning resources and digital technology or as managing meeting the demands of the curriculum while also integrating digital technology into teaching or both.
	Teachers became anxious when using digital technology due to not knowing enough about it (sufficient technological knowledge), difficulty in the correct execution of using digital technology, finding the app or website and figuring out how to use it, the possibility of digital technology failing them. Moreover, the learners can become easily overstimulated, irritable, and inattentive after using technology - sometimes even while using it. Teachers also found that learners have too much of technology at home and at school, thus technology use should be limited at school unless absolutely necessary.

The above findings revealed that teachers experienced many challenges when using digital technology to support reading development in Grade 1 learning contexts. These challenges were categorised into three main domains: classroom management, balancing books and screens, and the emotional labour of using digital technology. These were challenges which were experienced by all the teachers in different ways.

Teachers hold different definitions and perspectives of what constitutes digital technology which influenced the quality of digital technology integration into reading development. These findings suggest that teachers are not fully convinced of the benefits of using digital technology in Grade 1 classrooms as they preferred to rely on traditional methods of teaching reading. Their beliefs and attitudes also shaped how they integrated technology into their reading practices.

6.6.2 Question 3: The Emergence of New Insights

To answer the third and last research question: How do Grade 1 teachers' experiences of utilising digital technology to facilitate reading development in their classrooms lead to the emergence of new insights and understanding, I examined specifically teachers' experiences of using digital technology to support reading development.

The key findings emanating from answering the first two research questions led to the emergence of new insights and understandings. An analysis of the first research question

revealed varied teachers' understandings of digital technology integration into reading lessons. This showed that if teachers had a strong understanding of the different digital technology products, their use, and functions, then their perception of digital technology integration into reading lessons would have been much better. This is supported by Bereczki and Kárpáti (2021) and Jannah et al. (2020) who found that there was a link between teachers' perceptions of digital technology and the effectiveness of its integration into classroom settings. The interpretivist paradigm guiding this study also used the TPACK model, semi-structured interviews, and observations which provided valuable insights into how teachers perceive digital technology and its integration into classroom teaching. Teachers who understand different digital tools and how they are used educationally have a positive attitude towards the incorporation of digital technology into reading instruction. On the other hand, when teachers do not have sufficient knowledge on digital technologies; they may think that digital tools are irrelevant or less helpful to foster learning outcomes. This emphasises the importance of teacher-training through professional development programmes to increase teachers' TPACK and promote effective digital technology use in schools as emerged as a new insight below.

The analysis of the first research question precipitated the emergence of new understandings which mainly related to teacher agency that allowed for digital technology to be used in supporting reading development, but the efficacy in doing so was feeble. Hence, there is a need for formal training in the use of digital technology tools at schools. Workshops should be held so that teachers are taught on how to integrate technology into the content of lessons. This is confirmed by Spiteri and Chang Rundgren (2020) who see the need for the integration of the TPACK model into technology when teaching reading. Schools need to provide teachers with support in the cohesive use of digital technology in lessons. This research study contributes to knowledge which can be applied to other studies as it provides a more practical understanding of teacher agency as it relates to digital technology and how it is used in the context of reading development. The analysis of the data showed new understandings of how teachers use their agency to incorporate digital technology into their lessons, although their efforts are not always consistent and successful. Training is required for them to learn how to effectively integrate digital technology with content and pedagogy to improve the teaching of reading. Parents need to also be supportive regarding the use of digital technology in school, and at home for additional practice or for homework tasks. Supportive environments result in the most successful use of digital technology in educational spaces (Spiteri & Chang

Rundgren, 2020). This is not limited to the school only; other support structures (e.g. the DBE) empower the teachers to successfully and effectively navigate the complexities of digital technology integration, which enhances best practice to attain quality learning outcomes. Therefore, there is a need for teachers to have a clear conceptualisation of digital technology as it impacts their perceptions and experiences of teaching reading.

An analysis of the second research question also produced new insights. The impact of power outages and loadshedding impacted classroom management. Not much research was done on this phenomenon; hence, new insights reveal that there is the need for effective and innovative technology infrastructure for the uninterrupted operation of technology for reading instruction in times of power outages. This new insight exposes real-life constraints which destabilise well-designed pre-planned lessons which incorporate digital technology. Hence, the need for teachers to be flexible in their lesson planning and lesson delivery by having a backup plan to continue with the lesson being taught is imperative.

In support, Haleem et al. (2022) recognise that especially when using digital technology, there is a need to have lesson plans which are flexible. The TPACK model fosters the use of digital technology in a general sense, especially flexibility in reading development. This insight highlights technology as being a powerful tool in the classroom, its effectiveness in integration, and promoting teachers' ability to adapt their pedagogical practices to real-time challenges and to learners' unique needs which can be utilised in different and responsive ways in order to support and enhance the teaching of reading.

Moreover, the data analysis and results of this research exposed the struggle between balancing books and screens. This suggested that there was a lack of understanding of the integration of digital technology into the curriculum; hence, workshops are imperative to teach technology, pedagogy, and content integration in different subjects. This is an under-researched area which can precipitate future research.

Another key insight emanating from the findings of this research centred on balancing the curriculum (which was traditionally delivered by using hardcopy books) with the integration of digital technology, but finding the right mix of using traditional learning resources (books) and digital technology (screens) was advised. This is not as a replacement for traditional learning resources but rather meant to enhance current pedagogical practices. This ensures that instead of regarding them as separate entities, digital technology's purpose is to enrich

the learning process and not compete with traditional learning methods, resources, and experiences.

The last insight concerned the emotional labour of using digital technology which needs to be addressed. As digital technology becomes entrenched in school spaces in all grades, there is a need to find a way for teachers and learners to cohesively use digital technology. The findings of this study provided me with valuable insight on teachers' and learners' multifaceted emotions such as anxiety, demotivation, frustration, panic sensations, and becoming overwhelmed, all of which originate from the use of digital technology in classrooms. This emphasises the importance of firstly acknowledging the presence of these emotions in classrooms, and then addressing them to ensure that the teachers and learners are supported, empowered, and happy, rather than being paranoid, annoyed, frustrated, and even fearful of the integration of digital technology into teaching-learning practices. If teachers are able to manage their emotions, they will be better equipped to control learners in their classrooms, especially when using digital technology. This area is also under-researched, thus allowing space for new research.

In sum, I have to a great extent achieved the aim of the study which was to explore teachers' experiences of using digital technology to support reading development in Grade 1 South African learning contexts. This was attained by answering all three of the research questions which provided deep insight into the teachers' experiences.

6.7 INSIGHTS AND NEW KNOWLEDGE

As explained in the answering of research question 3, there are many new insights which have emerged therefrom. This was that if teachers had a strong understanding of the many different digital technology products available to them, their use, functions and perception of digital technology integration into reading lessons would have been much better. This led to the second insight which showed that there is a need for formal training in the use of digital technology tools at schools. This means that workshops need to be held to teach the teachers on digital technology integration into their lessons. Additionally, in the context of South Africa, there is the need for effective and innovative technology infrastructure for the uninterrupted operation of technology for reading instruction in times of loadshedding, power cuts and faults. Without this being available all the time, teachers need to have flexible lesson plans and teaching methods to accommodate this interruption and the varying needs of the learners in their classroom. As teachers manage to balance the use of technology with the curriculum, there is a need for teachers to learn to understand how digital technology can be

used to enhance their teaching practices using traditional tools and resources. The last insight from the study showed that we need to find a way for teachers and learners to cohesively use digital technology in the classroom, while managing emotions and creating a supportive learning environment.

6.8 IMPLICATIONS OF THIS STUDY

The research contributes to the field in a few ways. Given the scenario of the reading crisis in SA as well as the push to use technology, the need to explore how digital technology is used to support Grade 1 reading development was prevalent, prompting the study. First there is insufficient research done on using digital technology to support reading development in a general. Second this study shows the ways in which teachers understand digital technology is lacking- thus contributing to the field of knowledge. Third, by finding the gaps between the curriculum expectations and the teachers ability to implement digital technology in this highlights that there is room for more targeted research which builds on the findings of this study.

The implications of this study for the field of education are that while the amendment to the CAPS to include coding and robotics into teaching and learning in the FP exists and is relevant (DBE, 2021), there is much which needs to be done in terms of training and support, particularly from the school, on teacher-perceptions, among others. The gap between what is required of the teacher in terms of curriculum, pedagogy, and practice concerning integrating digital technology in the classroom needs to be addressed effectively to enhance teaching and learning.

The implications of this study point to the fact that teachers urgently need to develop comprehensive understanding of technological knowledge, including a having positive perception and attitude towards digital technology to use it effectively in their classrooms. Digital technology is not a skill which is instantly mastered - it takes much time, dedication, commitment, effort, and experimenting to ‘perfect’ using it which can be assisted through thorough training. Additionally, older teachers are more likely to not be familiar with the intricacies of technology, thus they should be trained on an ongoing basis (Boonmoh et al., 2021).

However, formal and informal training needs support from the school, colleagues and the parents. In SA, training is superficial and too general to be effective in integrating technology into lessons. Hence, a thoroughly and astutely structured ongoing training programme for

Grade 1 teachers is imperative to successfully integrate technology into classroom reading lessons. This will ensure that learners grasp the basics of technology (and reading skills) to meet the demand of the 4IR era.

Lastly, teachers are unfortunately unable to handle the many complexities on how to integrate technology into reading, given the emotional labour coupled with curriculum demands. Thus, they stick traditional methods of teaching largely because of the lack of training

Thus, this study shows that while digital technology has the capacity to be effective, the actual implementation of it is wanting. While there are many positives regarding the use of digital technology to support reading development, the negatives overshadow it to cause problems which are solvable but require the effective collaboration of all stakeholders in education.

6.9 LIMITATIONS

This study has limitations, some of which have been touched upon previously in the chapters. Qualitative research generally has more limitations according to Creswell (2018). For example, there are typically smaller sample sizes which make the generalisation of findings difficult. Mainly it is because qualitative research is subjective, meaning that the interpretation is reliant on the researcher who has may be biased, whether we choose to acknowledge it or not. Qualitative research also requires an extensive period of time and in some cases resources for data generation; this limits the opportunities for the feasibility of the study (Busetto et al., 2020). Also, the findings from qualitative research lack quantifiability, because it is difficult to use a standardised measure to compare the results (Byrne, 2022).

Specific to this study, the limitation pointed to the number and type of research sites chosen via criterion sampling which did not reflect the general situation in South African schools. These sites were private schools, so the findings from this study cannot be applicable to schools in the larger SA as the resources, teachers, training (albeit limited) and access to digital technology is incomparable between public and private schools. While accessing public schools would better reflect the real South African situation of the legacy of discrimination and disparities that affects us even today, it was not possible due to the lack of digital technology in many public schools that struggle with basic infrastructure and resources (Legotlo, 2014).

The sample size of four for this study was a limitation. It was very small, thus making this a very small-scale study. As such, it would not be possible to make strong claims in terms of

the results, as it would have been difficult and even controversial. Although in this study the methodological approach allowed for the close examination of teachers' experiences of using digital technology to support reading development of Grade 1 learners, it was not my intention to generalise findings to other contexts; but rather I wanted to generate understandings of Grade 1 teachers' experiences of using digital technology to support the reading proficiency of Grade 1 learners.

The small sample size (as a limitation) also increased the variability in the data which could have led to researcher bias which may have affected the reliability of the results (Creswell, 2018). As a researcher, I needed to first acknowledge my bias, but to avoid this bias I explained in detail the research processes. This, to an extent, reduced the researcher bias, but as humans we are not value free. The aspect of reflexivity included in chapter three and in previous literature, checked and controlled the possibility of bias in this study.

My last limitation related to being informed by three of the four teachers that the lesson I had observed was not 'the norm'; they had put in extra effort (to impress me) to design lessons so that I could see how they used digital technology to support reading development. Their ambivalence regarding their use of digital technology was exposed in their responses to the interview questions as well as in the delivery of their lessons.

In sum, the limitations of this study were acknowledged which increased its trustworthiness, in addition to aspects of triangulation which strengthened the integrity of the study.

6.10 RECOMMENDATIONS FOR FUTURE RESEARCH

The possibility of further research regarding this topic is immense. Since I only used private schools which very advantaged schools, a suggestion for further research would be aligned to finding public schools which have access to basic digital technology. This will allow the findings to be generalised to most schools in SA which have access to digital technology in different forms. Thus, was a more holistic picture will be attained.

Lastly, the TPACK model is something I believe teachers need to be trained in as it is crucial for technology integration in teaching and learning, irrespective of the subject. This can ensure that the TPACK model is effectively used by the teachers so that they have the basic knowledge to effectively implement digital integration. As a recommendation, pre- and in-service training including on-site workshops should be availed to all teachers to master the workings of TPACK model created by Mishra and Koehler (2006). It is also a necessity for 21st century ICT skills in line with the 4IR trajectory to be instilled in all learners, especially

in the FP. This proposed formal training on the TPACK model must be done at teacher-training institutions to prepare those entering the profession to teach through TPACK-digital technology integration. In addition, the Grade 1 curriculum needs to be scaled down to allow teachers time to integrate technology into classrooms, especially regarding the enhancement of reading proficiency to alleviate the literacy crisis in SA.

6.11 CONCLUSION TO THE STUDY

The world is evolving and adapting to using digital technology on a daily basis is imperative to progress to meet global demands. The educational space is not excluded from these advancements. Digital technology has transformed the way we learn whether we acknowledge it or not. Since, the teachers are the main role-players in education who deliver the curriculum, their perceptions and experiences of using digital technology to support reading development in Grade 1 learning contexts, are paramount. However, it is apparent that researchers have identified a disconnect between teachers' beliefs and their experiences when they implement digital technology to enhance reading development. This study revealed that teachers needed to be trained to use digital technology correctly in line with pedagogy and content. Teachers thus need support from all role-players who should effectively collaborate to successfully implement digital integration into literacy lessons. The challenges of time constraints, balancing books and screen, classroom management, lack of training, emotional labour, curriculum demands, power outages, and lack of support from role-players are prevalent, but can be circumvented through commitment from all concerned with uplifting levels of reading literacy in FP and other phases of schooling to eradicate the stigma of SA being one of the most underperforming countries in the world as far as reading-for-meaning is concerning.

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APPENDICES

Appendix A- Semi-Structured Interview Schedule for Grade 1 Teachers

Individual Semi-Structured Interview Questions for Grade 1 Teachers

Digital Technology to Support Reading Development

The following questions are a guideline for the semi-structured interviews.

Biography:

- How old are you?
- What degree do you possess?
- How long have you been teaching?
- What formal or informal training have you received in digital technologies?

Teachers' understandings of how digital technology can support reading:

- What are your understandings of digital technologies?
- Can you think of some examples of digital technologies?
- Do you feel adequately trained to use digital technology as a support tool for reading development? Why or why not?
- What kinds of support do you receive from the school, colleagues, parents etc. when using digital technology as a tool for reading development?
- How does digital technology for reading development support the individual learner and the class as a whole?

Using digital technology in the classroom:

- How often do you use digital technologies in your classroom and in what subjects?
- Provide examples of how you use digital technologies in your reading lesson?
- How do you use digital technologies in your classroom? Explain
- Do you use digital technology in your reading lessons?
    - How do you do so? (Apps, websites, devices)
    - Would you say the digital technology supports reading development?
        - Why or why not?
- Do you think are you successful in implementing digital technologies as a tool to support reading development in your class?
    - Why or why not?
    - Provide some examples of your successes
- Do you think there is a better way to use digital technologies in your classroom to support reading development?
- Do you feel that you know enough about digital technologies to understand how learners reading development is supported by it?
    - If not, what more would you need to know?

Challenges and opportunities:

- In what ways do you think digital technology supports reading development?

- In your opinion is using digital technology to support reading development beneficial to learners? Explain

- What challenges do you face when using digital technology to support reading development?

- Do you think the learners are benefitting by you using digital technologies to develop their reading skills?

    - Why or why not?

- What are some of the challenges you face in using digital technologies as a reading support tool?

    - How does this impact on the learners you are teaching?

Appendix B- Observation Schedule for Grade 1 Teachers' (semi-structured)



Observation schedule for Grade 1 Teachers

Digital Technology to Support Reading Development

OBSERVATION
Name: Date and time of observation: Type of reading lesson:
Introduction to the lesson What resources are used?
What are the activities that are being done?
What is the teacher doing? What are the teaching methods used?
Development of the lesson What resources are used:

What are the activities that are being done by learners:
What is the teacher doing? What are the teaching methods used?
What kind of engagement is happening? (Teacher-learner, learner-technology, teacher- technology etc)
<u>Conclusion of the lesson</u> How did the teacher facilitate reading?
How was digital technology in terms of reading used?
What was evidently gained by the learner in this lesson? (can be removed)

Appendix C - Codes

Codes to apply to semi structured interviews and observations

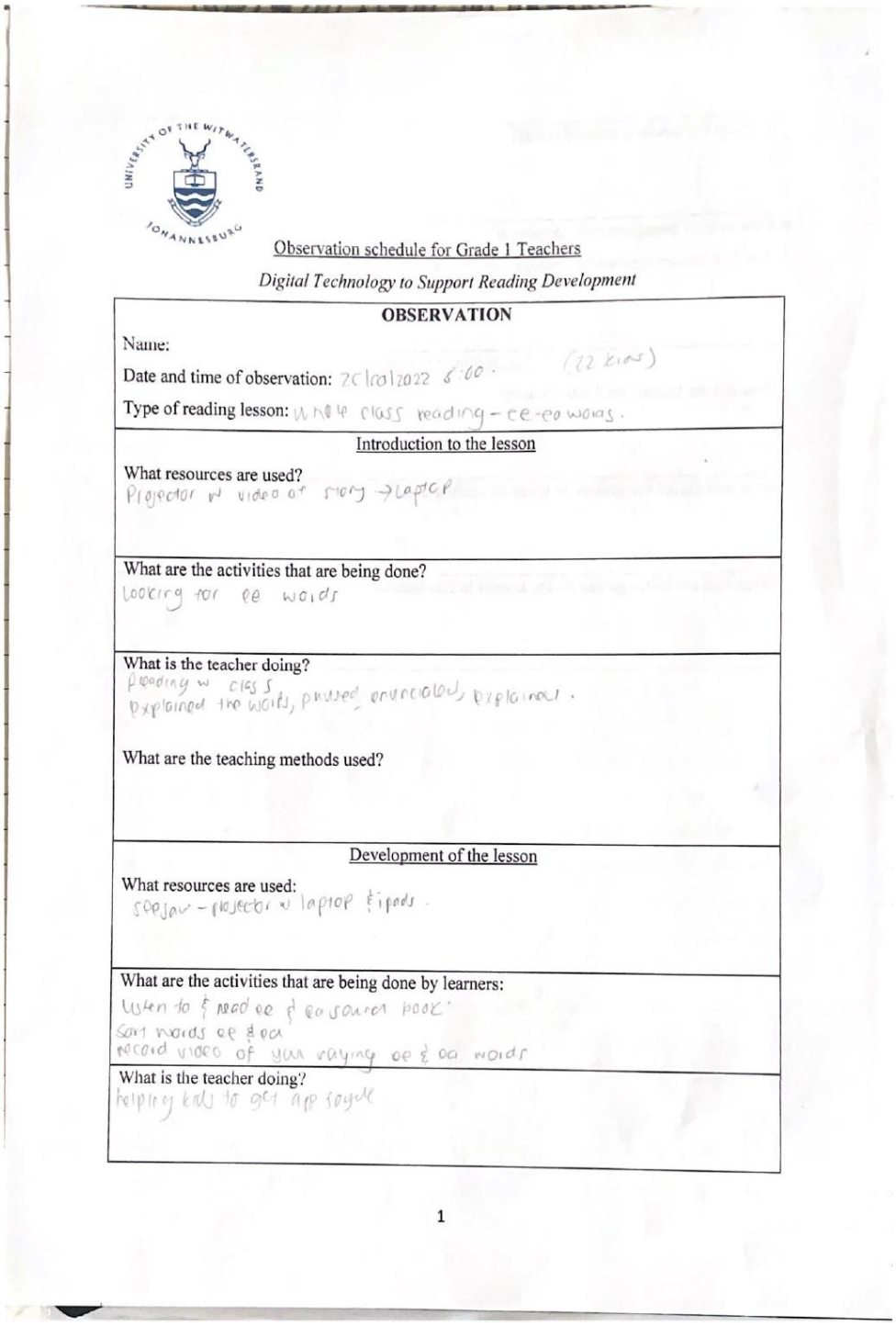
1. Training- formal
2. Training- informal
3. Teacher agency
4. Digital technology available
5. What is digital technology
6. Training
7. Support
8. Advantage-
9. Support- parents
10. Support- teachers
11. Support-school
12. COVID- positive/negative
13. Reading development- different vessel- positive
14. Digital technology for Reading development- positive
15. Digital technology frequency use
16. Challenge- digital technology use
17. Use of app for reading development
18. Teacher facilitation of reading development using an app
19. Challenge- loadshedding
20. Overcoming challenges
21. Selection and use of appropriate digital technology
22. Advantages- reading development
23. Digital technology is used to consolidate and support reading
24. Advantage- bridging the gap
25. Ways to improve
26. Effective use of digital technology needs a background in digital technology and reading [link TPACK]
27. Advantage-placement test accurate level
28. Advantage- digital technology does things quickly [less time marking] can consolidate learning at home
29. Disadvantage- time consuming if not familiar

30. Challenge- children's variation in knowledge is too big meaning too many different things being done at the same time
31. Advantage- gamification for learning
32. Advantage- show and tell [visual] advantage- assists low level learners [spelling]
33. Advantage- bringing digital technology into what you are learning
34. Digital technology for Reading development supports- individual
35. Digital technology for Reading development supports- whole class
36. Teachers use of digital technology in literacy
37. Teachers use of digital technology in other subjects
38. Teacher reflection on own use of Digital technology for reading development
39. Success in using digital technology to support reading development
40. Use of digital technology to support reading development beneficial to the learners- No
41. Use of digital technology to support reading development beneficial to the learners- Yes
42. Challenge- emotional
43. Digital technology for reading development-negative
44. Attitudes/Perceptions
45. Comparison of Digital technology to traditional teaching
46. Learners reaction to digital technology

Appendix D- Extract of a Coded Interview

Interviewee: So we've tried but the IT department is… yeah, I don't know. We've tried if we're amongst our colleagues definitely we would also run ideas by each other, but with the IT department, I'd say no.	11- Support-school 10- Support- teachers 11- Support-school
Interviewer: And then parents?	9- Support- parents
Interviewee: Parents, I think we've never actually had to ask them for support. And other than doing mathematics and Reading Eggs at home… again, it's the same thing. Some parents are great. They encourage their children to use it. Other parents, have to sit with their kids and therefore they don't have the time, so they don't do it.	
Interviewer: In your opinion, how does digital technology for reading development support your individual learner?	34-Digital technology for Reading development supports- individual
Interviewee: So to me, the only way that I've been exposed to how it can support them is through an app. So the Jolly Phonics app and the Reading Eggs app… that in the past if a child is struggling, you'd say, "Well try something different." Because we do all the sort of written stuff at school. So to make it a little bit more fun at home, parents who have engaged and supported their children, you have seen an improvement.	4-Digital technology available 38-Teacher reflection on own use of Digital technology for reading development
Interviewer: Then if you do use it in a whole class situation, how would it support your learners?	35-Digital technology for Reading development supports- whole class
Interviewee: It's learning through a different way. It's making learning fun. If they love the app, if they love the game they're playing, it's going to enhance it. So it's going to make it, it's a different	13-Reading development-

Appendix E- Extract Observation Schedule Used



Observation schedule for Grade 1 Teachers

Digital Technology to Support Reading Development

OBSERVATION

Name:

Date and time of observation: 26/04/2022 8:00. (22 kids)

Type of reading lesson: whole class reading - ee-ea words.

Introduction to the lesson

What resources are used?
Projector w video of story → laptop

What are the activities that are being done?
looking for ee words

What is the teacher doing?
Reading w class
explained the words, paused, encircled, explained.

What are the teaching methods used?

Development of the lesson

What resources are used:
Soosjaw - projector w laptop & ipads.

What are the activities that are being done by learners:
Listen to & read ee & ea source book.
Sort words ee & ea
record video of you saying ee & ea words

What is the teacher doing?
helping kids to get app going

1

What are the teaching methods used?
What kind of engagement is happening? (Teacher-learner, learner-technology, teacher- technology etc) TL, LT, TT
Conclusion of the lesson How did the teacher facilitate reading? Read with kids, pointed out errors, checked for understanding.
How was digital technology in terms of reading used? Used iPads to read & do reading activities
What was evidently gained by the learner in this lesson?

Appendix F- Described Lesson

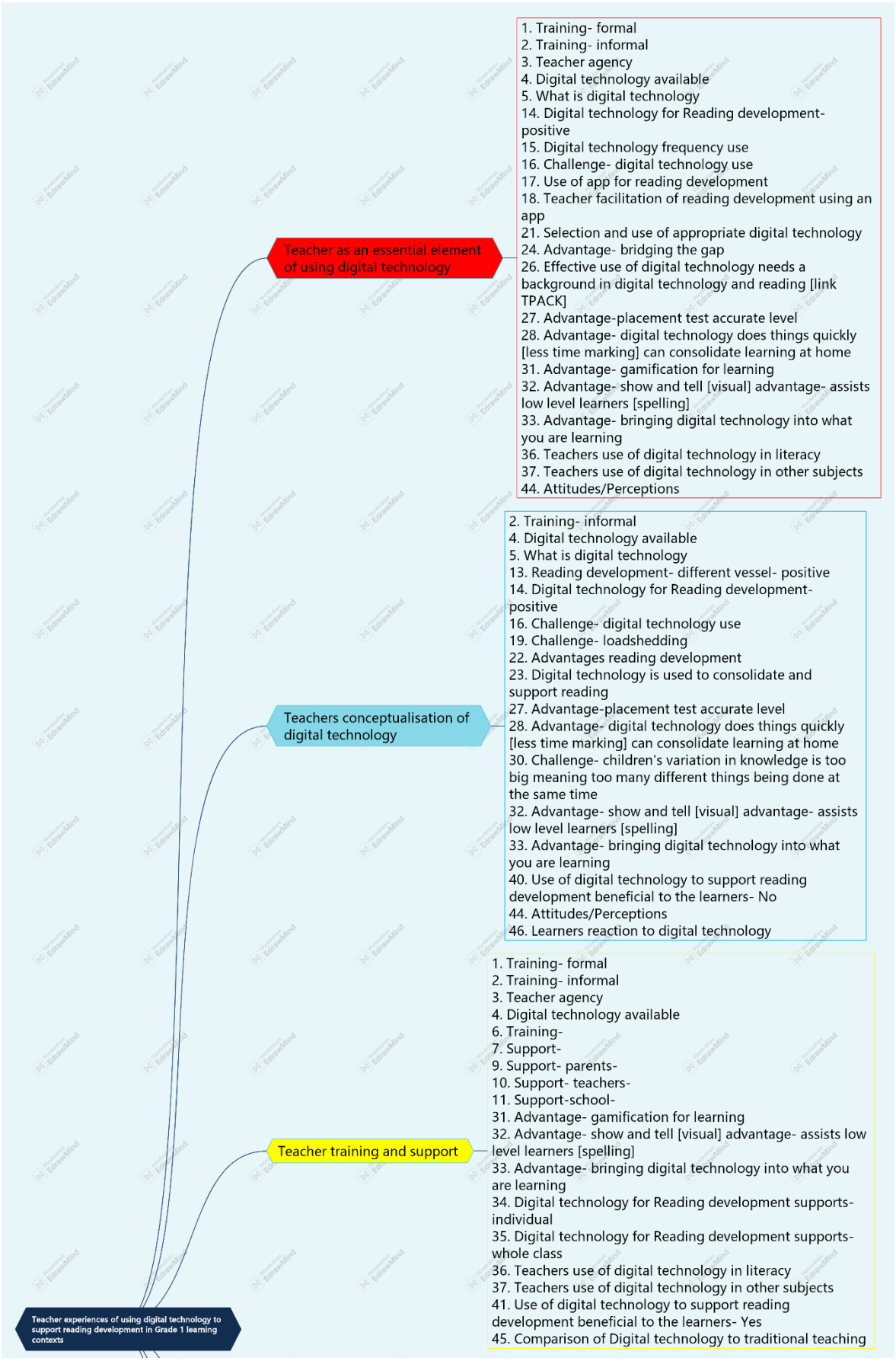
Teacher Mpho:

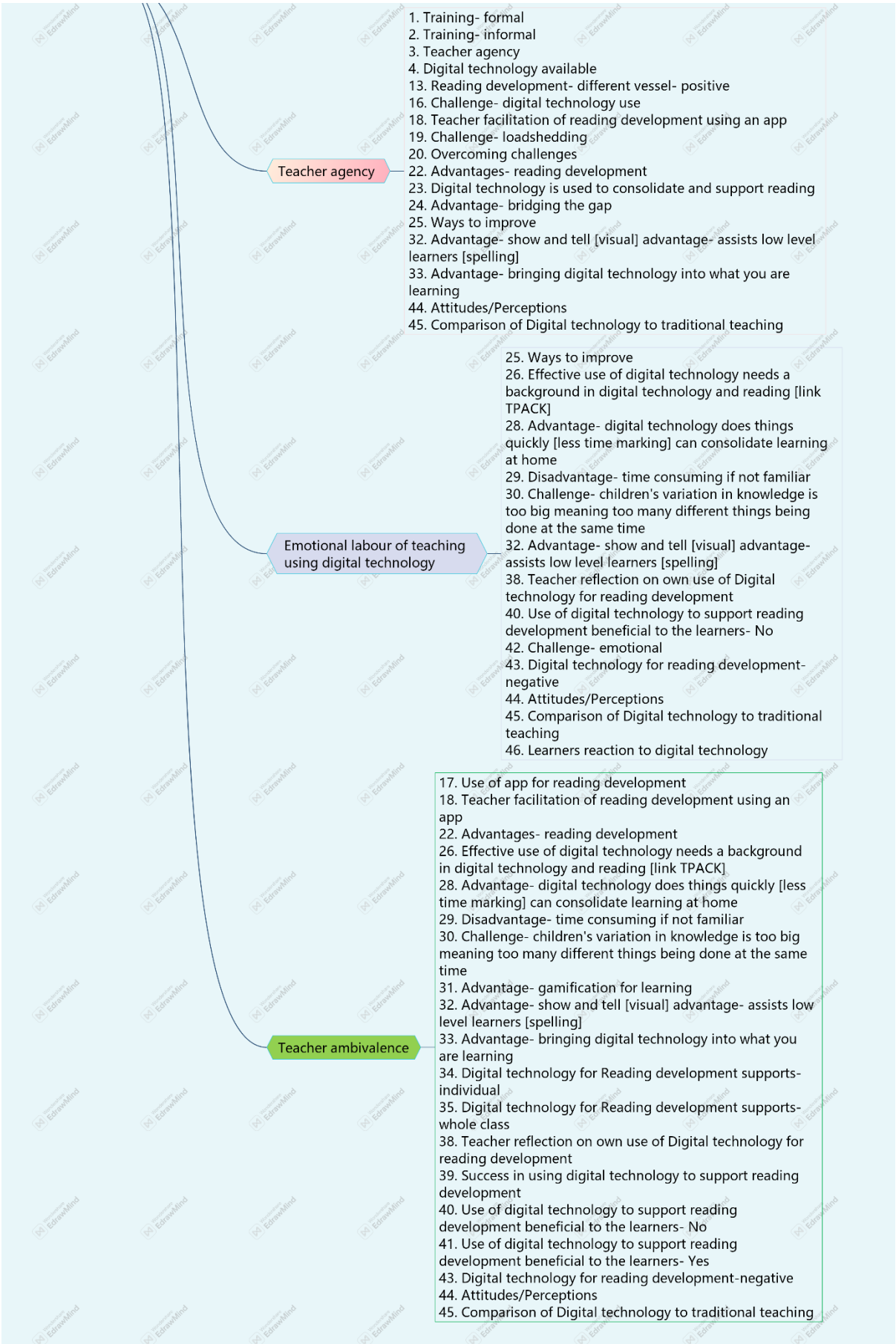
The lesson took place on 25/10/2023 at 8:00 am. This was a whole class reading activity and the focus was on the ee and ea words. The lesson began with the teacher settling the learners and asking them to quiet down and pay attention. The learners all had iPads in front of them but were not instructed to use them as yet. The teacher used her laptop and projector to play a story called Fred Flea in the form of a video from YouTube which was read by the voice in the video as well as having the words of the story projected. The teacher let the video play once, then asked the learners to read the words which the teacher pointed to as the video was playing. It was here, I noticed that the video was going too fast i.e. the pace was too quick for the learners, which resulted in them being less engaged. As a result, the teacher paused the video a few times to try to get the learners back to speed. The teacher also stopped the video at words which she anticipated that the learners did not understand and explained to them its meaning while engaging with them on its meaning in the story- this was words such as pleaded, sweet pea, jeep leak and creaky. The teacher briefly discussed the story and its contents with the learners, asking them questions about the characters in the story and about what happened.

The teacher then asked learners to open the Seesaw application and go to the story called Sheep in a Jeep. This process was projected on the board and learners could follow if they did not follow or understand the verbal instructions. Here the teacher asked the learners to listen to and read the story aloud, then they were required to sort the words as ee or ea and then they were required to add a response in the form of a video or audio of them saying all the ee and ea words which they sorted in the previous activity. The teacher assisted some learners in sorting out the iPad initially but was not actively involved in the lesson after that, was self-learning. It was noted by the teacher that not all learners were reading the story, some listened to it but did not read it, she drew their attention to this by saying that they needed to read the story aloud as it would help then in the response. The teacher was walking around checking the learners doing the activities and assisting if necessary. The teacher facilitated this lesson by managing the iPads and the lesson content available and relevant to the learners. The learners were engaged with the iPads but did not all follow the instructions correctly. The teacher had some learners play their recordings and videos aloud to her, which she corrected at the same time and had them rerecord themselves. She stated that the program does not correct speech, so she has to check those responses individually by listening to them all.

As the learners finished at different times, the learners who finished first and their recordings were checked were told that they can open the application called Reading Eggs and do any activity they like, as there was only about 5 minutes left before the lesson time was over.

Appendix G- Initial Thematic Mind Map




Teacher agency
1. Training- formal
2. Training- informal
3. Teacher agency
4. Digital technology available
13. Reading development- different vessel- positive
16. Challenge- digital technology use
18. Teacher facilitation of reading development using an app
19. Challenge- loadshedding
20. Overcoming challenges
22. Advantages- reading development
23. Digital technology is used to consolidate and support reading
24. Advantage- bridging the gap
25. Ways to improve
32. Advantage- show and tell [visual] advantage- assists low level learners [spelling]
33. Advantage- bringing digital technology into what you are learning
44. Attitudes/Perceptions
45. Comparison of Digital technology to traditional teaching
Emotional labour of teaching using digital technology
25. Ways to improve
26. Effective use of digital technology needs a background in digital technology and reading [link TPACK]
28. Advantage- digital technology does things quickly [less time marking] can consolidate learning at home
29. Disadvantage- time consuming if not familiar
30. Challenge- children's variation in knowledge is too big meaning too many different things being done at the same time
32. Advantage- show and tell [visual] advantage- assists low level learners [spelling]
38. Teacher reflection on own use of Digital technology for reading development
40. Use of digital technology to support reading development beneficial to the learners- No
42. Challenge- emotional
43. Digital technology for reading development- negative
44. Attitudes/Perceptions
45. Comparison of Digital technology to traditional teaching
46. Learners reaction to digital technology
Teacher ambivalence
17. Use of app for reading development
18. Teacher facilitation of reading development using an app
22. Advantages- reading development
26. Effective use of digital technology needs a background in digital technology and reading [link TPACK]
28. Advantage- digital technology does things quickly [less time marking] can consolidate learning at home
29. Disadvantage- time consuming if not familiar
30. Challenge- children's variation in knowledge is too big meaning too many different things being done at the same time
31. Advantage- gamification for learning
32. Advantage- show and tell [visual] advantage- assists low level learners [spelling]
33. Advantage- bringing digital technology into what you are learning
34. Digital technology for Reading development supports- individual
35. Digital technology for Reading development supports- whole class
38. Teacher reflection on own use of Digital technology for reading development
39. Success in using digital technology to support reading development
40. Use of digital technology to support reading development beneficial to the learners- No
41. Use of digital technology to support reading development beneficial to the learners- Yes
43. Digital technology for reading development-negative
44. Attitudes/Perceptions
45. Comparison of Digital technology to traditional teaching

Appendix H- Ethical Approval

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Research Office

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49 Dadabhai

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: H23/06/06**
PROJECT TITLE	Teacher experiences of using digital technology to support reading development in Grade 1 learning contexts
INVESTIGATOR(S)	Miss Q Dadabhai
SCHOOL/DEPARTMENT	Wits School of Education/
DATE CONSIDERED	23 June 2023
DECISION OF THE COMMITTEE	Approved Risk Level: Minimal
EXPIRY DATE	04 September 2026

DATE 05 September 2023 **CHAIRPERSON** _____
(Professor J Watermeyer)

cc: Supervisor : Dr C Martin

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **A SIGNED COPY** returned to the Secretary electronically. Unreported changes to the application may invalidate the clearance given by the HREC (Non-Medical)

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure as approved I/we undertake to submit an amendment of the protocol to the Committee. **I/we agree to completion of a regular progress report. For Minimal and Low Risk studies, this is due annually on 31 December. For Medium and High Risk studies, this is due twice annually on 30 June and 31 December.**

_____ 05 / 09 / 2023
Signature **Date**

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES