A COMPARATIVE STUDY OF PRINCIPALS' ROLES IN THE IMPLEMENTATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES

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DECLARATION

I declare that the thesis, **A COMPARATIVE STUDY OF PRINCIPALS' ROLES IN THE IMPLEMENTATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES**, as contained herein, is my own, original work and that all the sources that I have used or quoted have been indicated and acknowledged using complete references. I hereby declare that I am aware that the copyright of this doctoral thesis is vested in the University of the Free State. I hereby declare that all royalties regarding intellectual property developed during and/or in connection with the study at the University of the Free State will accrue to the University.

31 July 2024

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SHIREEN BASJAN DATE

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DEDICATION

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ABSTRACT

Education is crucial for human civilization and requires technology, particularly in teaching and learning. Information and communication technologies (ICT) revolutionized education in the 1980s, leading to the potential obsolescence of textbooks. Global education systems must embrace technological advancements and changes to adapt to the Fourth Industrial Revolution. ICT will facilitate education through improved access, equity, stronger connections, and enhanced professional development of teachers. However, ICT is not yet universally accepted or used. School principals and teachers play a vital role in ensuring ICT implementation effectively. Research shows that ICTs significantly enhance the quality of education, and the need for closer integration of technology in the school system is highlighted. The South African e-Education policy aims to revolutionize learning and teaching, but school management policies influence its implementation.

This research study examines the role of principals in implementing Information and Communication Technology (ICT) in schools. The study uses an interpretive qualitative approach and a multiple case study design. The research population includes nine principals and fifty-six teachers from nine primary schools in Motheo and Xhariep Districts, with seven teachers from each school participating. Data collection methods include focus-group interviews, semi-structured individual interviews, document analysis, and observation. The study investigates the ICT capacities of principals in different school settings and their impact on effective implementation. Principals in quintile 1-3 and quintile 4-5 schools are proficient in using computers but lack formal training. Teachers appreciate ICT's value but lack support. Barriers to successful implementation include policy absence, infrastructure issues, load shedding, electricity supply interruptions, equipment accessibility, outdated laptops, and insufficient internet connectivity. The leadership role of principals is crucial, but there is room for improvement in leadership support and classroom technology use.

The study explores the role of principals in implementing ICT in South African schools. It provides insights into the digital divide and offers guidance on effective strategies for successful implementation. The findings can inform decision-making and practice in ICT implementation, support ICT integration initiatives, and help teachers improve

their ICT proficiency. The study fills a gap in research by comparing ICT implementation in different settings and the principal's role. It explores various theories in leadership and management, generating new knowledge and fostering innovation in leadership and management practices. Further research could explore resource allocation, maintenance, and security challenges schools face, principals' instructional leadership role in ICT, strategies for implementing management and leadership principles, and strategies to bridge the digital divide. A mixed-methods study could evaluate ICT implementation's effectiveness and impact on learner achievement.

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LIST OF ACRONYMS / ABBREVIATIONS

4IR	Fourth Industrial Revolution
AICTE	All *India* Council for Technical Education
CALP	Computer-Aided Learning Programme
CLASS	Computer Literacy and Studies in Schools
DBE	Department of Basic Education
DER	Digital Education Revolution
DoC	Department of Communication
DoE	Department of Education
ICT	Information and Communication Technology
IT	Information Technology
MNE	Ministry of National Education
MONE	Ministry of National Education
NCF	National Curriculum Framework
NCPF	National Cybersecurity Policy Framework
NETP	National Education Technology Plan
NPC	National Planning Commission
OECD	Organization for Economic Co-operation and Development
PAM	Personnel Administration Measures
PI	Poverty Index
PTTC	Primary Teacher Training College
RSA	Republic of South Africa
SASA	South African Schools Act
SGB	School Governing Body
SMT	School Management Team

STEM	Science, technology, engineering, and mathematics
TALIS	Teaching and Learning International Survey
UNESCO	United Nations Educational, Scientific, and Cultural Organization

CHAPTER 1
INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

As an essential component of human civilisation, education shapes, guides, and projects human civilisations into their best prospects. A global educational setup would only be possible with the general acceptance and use of adequate technological resources, particularly in teaching and learning (Saif, Ansarullah, Othman, Alshmrany, Shafiq & Hamam, 2022:2). During the 1980s, Information and Communication Technology (ICT) revolutionised education, leading to the potential obsolescence of textbooks due to its widespread use in classrooms (Mdhlalose & Mlambo, 2023:55; Mirzajani, Mahmud, Ayub & Wong, 2016:28). Based on the United Nations Educational, Scientific, and Cultural Organization's (UNESCO, 2022) principles for ICT in education policies, it is well known that information and communication technologies (ICT) have been used to promote education in many regions of the world. While these initiatives have been advancing education, there has also been an increase in inequality of access to high-quality digital learning opportunities; for example, around one-third of learners globally did not have access to distance learning during the COVID-19 pandemic. Nevertheless, Etedali (2021:1) supports the view that ICT has become ubiquitous throughout many different fields, such as education, resulting in a concept known as "digital identity."

The Fourth Industrial Revolution, also known as Industry 4.0, focuses on integrating emerging technologies such as the internet, artificial intelligence and robotics into various sectors such as business, education and the world of work. According to Elayyan (2021:23-24), science, technology, and communal culture were the main tools used during the Fourth Industrial Revolution to improve human life. The technological advancements of this revolution also affected education institutions, and consequently, schools and universities created courses and programmes that corresponded with job needs. Global education systems must adapt to the Fourth Industrial Revolution, requiring open-mindedness from principals and teachers to embrace technological advancements and changes (Yende, 2021:58; Thannimalai & Rama, 2018:202). According to Jiang, Li, Han and Yang (2019:160), ICT will facilitate education through improved access and equity, stronger connections between

individuals and organisations, and enhanced professional development of teachers. ICT is not yet universally accepted or used, even though it is important to humanity today. Using ICT to teach requires teachers to be physically and mentally ready, and their training should aim towards this (Egede, 2021:2). Information and communication technologies (ICTs) are essential tools for teaching and learning in the 21st century. Over the past several decades, technology has transformed learning patterns at all levels, including primary education. Ali (2020:17) argues that teaching digital learners without understanding how they learn is impossible.

Technology has revolutionised youth access to knowledge, necessitating continuous evolution in education to meet the specific learning outcomes of the 21st century (Hannaway, 2019:1). Cueva and Inga (2022:1) explain that using technology and ICT tools has given teachers a much greater understanding of the learning process. According to these authors, traditional teaching-learning methods are outdated and not very innovative and do not fully contribute to education progress (Cueva & Inga, 2022:1). Vijayalakshmi (2021:11) emphasises that ICTs allow learners to learn independently so that they can participate actively in their learning.

The researchers cited in the above paragraphs have made it clear that the need for ICT in schools is evolving rapidly and that school principals and teachers are essential to ensuring that ICT is implemented effectively. In this comparative study, the researcher aimed to investigate principals' roles in implementing ICT. This study was conducted in the so-called lower (quintiles 1-3) and the higher quintile schools (quintiles 4-5), comparing how principals execute their roles within these different school settings.

1.2 BACKGROUND TO THE STUDY

The following section discusses background literature about the importance of ICT in general classrooms and the roles of the teacher and principal.

1.2.1 The importance of ICT

The value of ICT in schools lies in its ability to help learners create knowledge, share knowledge, solve problems, communicate, learn in groups, and develop economic and

social change (Makgati & Awolusi, 2019:50; Mathipa & Mukhari, 2014:1215). Technology has brought cultures together and has become a crucial part of youth culture, as Levin and Mamlok (2021:1) describe, with today's learners struggling to survive in a technologically laden society in which learners with poor technological skills find it difficult to cope in the competitive and universal environment of the future. Nowadays, youth have all sorts of knowledge at their fingertips, unlike the youth of previous generations, and the Department of Education (DoE) needs educational programmes to meet specific learning outcomes (Hannaway, 2019:1).

By utilising ICT, quality teaching and learning resources can be accessed in ways that are less dependent on teacher-learner colocation and coordination (UNESCO, 2022:17). According to Phutela and Dwivedi (2019:1), ICT in education enhances creativity, interaction, and knowledge sharing, along with learner development. Nowhere has this been more practically evident than during the recent COVID-19 pandemic. Approximately 1.6 billion learners were affected by COVID-19 outbreaks in 200 countries worldwide. Many thousands of people experienced significant changes in their lives because of the closure of schools, universities, and other learning spaces (Das, 2022:1). Because of COVID-19, however, we have been forced to establish new ways of instructing and evaluating digital learning (Dhawan, 2020:18).

1.2.2 The importance of ICT in the classroom

Traditionally, education has been provided by having a single speaker, speech, and audience. Still, now, generally because of ICT, the process has become horizontally and vertically differentiated (Saif et al., 2022:22). As technology advances, ICT is becoming a vital component of classroom teaching (Haleem, Javaida, Qadri & Sumanc, 2022:275). It has become difficult for teachers to impart knowledge to 'the Net Generation', who come to class with a wealth of multimodal skills and are continually connected, motivated, and responding to an ever-changing world (Mishra, Gupta & Shree, 2020:1). Winter, Costello, O'Brien and Hickey (2021:246) therefore emphasise the importance of teachers' adopting and adapting to technology as soon as possible to perform their pedagogical activities with ease and confidence.

Since traditional education methods no longer equip learners to be productive members of society, ICT is crucial for learners to function in society (Haleem et al.,

2022:275). Winter et al. (2021:236) recommend that teachers change their attitudes and beliefs regarding teaching activities to confidently and efficiently perform pedagogical activities.

ICT should be incorporated into the classroom to assist learners in developing and applying 21st-century skills (Ali, Ali & D'Souza, 2023:64; Ratheeswari, 2018:45). As mentioned by Baloul (2023:43), ICT can support learning and allow learners to be fully engaged with the learning material. It will be apparent to learners what information they need, why they need it, and how to get it. Phutela and Dwivedi (2019:2) highlight that teachers use technology to enhance their teaching methods by providing practical information, while learners use technology to enhance their understanding of a specific subject. Furthermore, Sun (2019:263) emphasises that teachers and learners should participate in classroom discussions, and the need for child-centred education implies that teachers must be prepared to use different technologies in the classroom to make teaching more engaging. Haleem et al. (2022:276) argue that ICT can facilitate a teacher's ability to accomplish set goals quickly, and teachers and learners can communicate more effectively using these technological devices. Due to learners' familiarity with technology and their ability to learn better, technology nowadays plays a critical role in schools, particularly in the classroom (Jadhav, Gaikwad & Patil, 2022).

1.2.3 Utilisation of ICT in the classroom: the role of the teacher

The traditional way of learning knowledge from teachers is through teacher-centred instruction, which is boring and does not engage learners (Haleem et al., 2022:275; Bhattacharjee & Deb, 2016). Balakishiyeya (2020:121) explains further that the teacher teaches more theoretical knowledge while the learners listen, so traditional education has fewer requirements. Through ICT, however, information can be accessible anywhere and anytime, so learners can access it whenever they want to. This can impact how learners learn since procedures are now learner-driven rather than educator-driven (Sharma, 2020:11). According to Mangare, Kandamali, Mushi, Ndumbaro and Muhuwa (2022:23), new technologies have transformed education, making it more meaningful, customised, and accessible. ICT's impact on teachers' perception and learning is heightened when used effectively. In addition to providing learners with creative and individualised ways to express their understanding, ICT-

trained teachers can better prepare them for ongoing technological changes (Vidhate, 2019:2).

1.2.4 The impact of ICT on teaching and learning

The Department of Basic Education (DBE) and the Gauteng Department of Education (GDE) have emphasised that ICT integration is crucial to redressing historical inequalities (Rasool & Naidoo, 2024:2). Using ICTs, learners and teachers can tailor learning to fit their individual needs, making it necessary for schools to adapt accordingly (Makgati & Awolusi, 2020:51). According to Garg (2021:1), the use of ICT enhances learning and can add new dimensions that were previously unavailable, while also enhancing learner engagement in collaborative learning. In Paudel's (2020:23) view, ICTs can significantly improve education on several levels by motivating learners, improving skills acquisition, and improving teacher training. As explained by Molotsi (2022:2), ICTs allow schools to respond efficiently to the requirements of instructors and learners. Technology enhances learners' learning efficiency through educational videos, stimulation, data storage, database use, mind mapping, guided discovery, brainstorming, and music research (Osuji & Pepple, 2019:21; Ghavifekr & Rosdy, 2015:176). Learning processes are changing due to adding components of essentialness to learning conditions, such as virtual environments. ICTs can provide excellent instructional opportunities, and it isn't easy to imagine future learning conditions without their support (Sharma, 2020:12).

1.2.5 Integration of ICT in the teaching and learning process

The teaching profession is becoming increasingly challenging as knowledge proliferates and modern technology demands that teachers learn how to use it (Gravett, 2022). ICT enables learning anytime, anywhere, through online courses, teleconferencing classrooms, and various other online resources. Knowledge can be acquired through video clips, audio sounds, and visual presentations (Haleem et al., 2022:277; Fu, 2013:112). Martin (2022:24) advocates integrating ICT in classrooms, suggesting using smartphones for learning and replacing traditional chalkboards with interactive digital whiteboards. Makgati and Awolusi (2019:51) assert that by using ICT, teachers can stay informed about innovative techniques in instruction, evaluation

mechanisms, etc. In education, ICT is fundamentally committed to access to learning, as learners can read digital books, obtain and practise answering old assessment papers, and so on. In addition, exposure to ICT will enable learners to reach people, guides, specialists, scientists, and experts worldwide (Sharma, 2020:11).

1.2.6 The importance of supporting teachers' use of ICT

The isolation of individual teachers can be overcome through ICT training, continuous connection with a larger teaching community, and the promotion of collaboration between teachers through multimedia simulations of effective teaching practices. The professional development of teachers should utilise both the intended and unintended outcomes of ICT (Vandeyar & Adegoke, 2024; Ratheeswari, 2018:47). The advantages of ICT are significant, but many teachers are not yet prepared to use it effectively in their classrooms, implying that pre-service teachers ought to be exceptionally well trained (Tiba, 2021).

The Net Generation was born between 1982 and 1991, and they have grown up with technology, which makes incorporating ICT tools within classroom lessons necessary (Ali, 2020:17). Mukherjee and Maity (2019:497) note that in-service training is crucial for teachers to integrate ICT into the classroom successfully. They also emphasise giving teachers enough time to plan and explore new technologies. Based on the above discussions (cf. 1.2.1-1.2.6), it is clear that the need for leadership intervention and support is a high priority. Next, a brief discussion will be provided on the role of the principal in ensuring that ICT implementation is driven towards the intended outcome.

1.2.7 The role of the principal in ICT implementation

Oraifan (2021) observes that the leadership of a school has an important influence on the school's results by shaping teachers' levels of motivation and skills and by creating a positive atmosphere for learning. The South African Standard for Principalship (DBE, 2016:11) emphasises the importance of principals in integrating ICTs into active and critical learning, enhancing school effectiveness and equity. Having credibility and authority among their peers, these school leaders also need to have a future perspective, think globally, possess political acumen, and have a learner-centred

understanding of what makes effective learning and appropriate classroom practices. Moreover, they ought to thoroughly understand how ICT decisions will affect their school in the future (Klinck, Thutulwa & Pelser, 2023:3).

For ICT to be successfully implemented in schools, school leaders must have clear visions and strategies, or else there will be poor coordination of activities. Only the most enthusiastic teachers will be interested in implementing ICT (Van Greunen, Kativu, Veldsman & Botha, 2021:8). Almost every aspect of our lives is affected by technology. Schools have a significant role to play in educating individuals who can effectively use technology. Implementing technology in teaching and learning is crucial for quality education, and teachers must use it effectively to ensure effective learning (Joynes, Rossignoli, Fenyiwa & Amonoo-Kuofi, 2019:25). School principals are expected to lead and implement ICT use in their schools so that teachers can integrate new technologies into the curriculum. School principals must be technology leaders to instruct and assist teachers and learners in using technology (Kwatubana, 2023:188).

1.3 THE RESEARCH PROBLEM AND RATIONALE FOR CONDUCTING THE STUDY

Kumar (2020:59) claims that ICTs significantly enhance the quality of education. Timotheou, Miliou, Dimitriadis, Sobrino, Giannoutsou, Cachia, Monés, and Ioannou (2023:6699) emphasise the significant benefits of ICT in schools and the need for all stakeholders to implement it for educational development and to increase productivity. Hero (2019:102) and Bhattacharjee and Deb (2016:2) highlight the technological gap between societal progress and teacher instructional activities and the need for a closer implementation of technology in the school system.

Chomunorwa and Mugobo (2023:81) highlight the fact that the South African e-Education policy aims to revolutionise learning and teaching in schools. Teachers were expected to change their practice along with e-Education, and new pedagogical practices were expected to develop naturally. School management policies and methods can influence ICT adoption in schools. Still, some lack incentives for teachers and fail to appreciate the consequences of such adoption (Al-Shboul, 2019:67). According to Van Greunen et al. (2021:2), the e-Education policy aimed to enhance ICT proficiency among South African school principals, teachers, and learners by

2013, promoting the confident and creative use of ICTs. According to Chikuni, Makwambeni and Chigona (2021:6), despite the White Paper on e-Education offering a framework and implementation methodologies, South Africa's technology-enhanced learning has not progressed as anticipated. As Sikhakhane, Govender and Maphalala (2021:95) point out, there is clearly no practical enforcement of the e-Education policy in South African schools.

Kwatubana (2023:186) mentions that the school principal has a pivotal role: to implement ICTs, enforce e-policies, and serve as technology leader, head learner, and initiator. The principal's support, learning, and use of technology in tasks and adequate development opportunities are crucial for effective school ICT implementation (Kafu-Quvane, 2021). As Yamamoto and Yamaguchi (2019:48) noted, transformational leadership is crucial for implementing educational technology, as principals must be hands-on users and role models, understanding and utilising ICT in teaching and learning. According to Ruloff and Petko (2021:4), managing the use of ICTs is both challenging and rewarding, and digital technologies have significantly changed the roles and responsibilities of school leaders. As new ICTs develop, planning and integrating ICT in education become increasingly complex (Haleem et al., 2022:277). It is no longer just a complex and demanding challenge for teaching and learning but a threat, a necessity, and an opportunity. As Yamamoto and Yamaguchi (2019:48) noted, integrating ICT into a school's daily operations cannot be accomplished without a sustained commitment from the school leadership. Apsorn, Sisan and Tungkunanan (2019:640) contend that administrative support for integrating ICT, curriculum and instruction is underestimated. Administrative support refers to computer systems monitoring the school's day-to-day operations, such as learner enrolment, resource availability, workforce, and finances. ICT can facilitate academic planning, preserve learner record systems, enhance communication, and make information easily accessible (Melita, Tanui & Oruta, 2019:364). School principals must know the technologies used to assist teaching, learning, and evaluation. This forms part of their instructional leadership responsibility (DBE, 2016). Furthermore, a sound understanding of technologies will enable them to support teachers effectively, make informed decisions, improve communication within the school community, utilise data for decision-making, and identify professional development opportunities (Mthanti & Msiza, 2023:2; DBE, 2016). Mestry (2017:1) also emphasises the importance of

principals' understanding of the significant role of ICT in enhancing teaching and learning. Principals must motivate themselves to be visionary leaders in this rapidly evolving digital environment (AlAjmi, 2022).

It is common knowledge that public schools in South Africa are categorised according to a quintile system. Schools in wealthier areas fall in the quintile 4 to quintile 5 bracket, while schools in less advantaged areas usually fall in the quintile 1 to 3 bracket. There are vast economic disparities in the country and between rich and poor schools (Plaatjies, 2020:10). This leads to well-known inequalities in terms of resources, training and ICT implementation, leading to the widening of the digital divide. Differences also influence the digital divide in how ICT is used and implemented in education (Van Deursen & Van Dijk, 2019).

Although many studies have been conducted on ICT implementation in various contexts, less literature is available on how ICT is implemented and compared across different school contexts. This study was prompted by the need to investigate the digital divide in various South African school contexts and to discover ways schools can provide equal educational opportunities to all learners. In this process, the role of the principal is crucial. Hence, the researcher conducted a comparative study of their roles in implementing ICT. The primary motivation for adopting a comparative approach was to foster a deeper understanding of ICT implementation across the different school contexts (quintile 1-3 vs quintile 4-5). The aim was to close the gaps in current research on this topic, which is silent about the role of principals in ICT implementation across different quintiles, given the vast digital divide that seems to exist. Quintile 4 and 5 schools are generally better led, managed, and resourced than quintile 1, 2 and 3 schools. Policy documents also focus on a one-size-fits-all leadership and management role without considering the need for a context-responsive approach. Little is known about these disparities in practice and how they could be rectified through the refinement and adjustment of principals' leadership and management roles for improved ICT implementation. This study intends to respond to the need for research in these areas, generating new insights and identifying commonalities and patterns of how school principals implement ICT.

1.4 RESEARCH QUESTIONS

The above-mentioned research problem led to the formulation of this study's primary and secondary research questions.

1.4.1 Primary research question

The primary research question is:

What are the roles of principals in implementing information and communication technologies across different school contexts?

1.4.2 Secondary research questions

The secondary research questions were formulated as follows:

- To what extent do barriers hinder the successful implementation of ICT in different school settings?
- What are the critical leadership duties and functions that principals perform in implementing ICT in various school environments?
- What are the critical management duties and functions that principals perform in implementing ICT in various school environments?
- Which strategies should principals use for successful ICT implementation across different school settings?

1.4.3 Aims and objectives of the study

This study aimed to compare principals' roles in implementing information and communication technologies across different school contexts. The main objectives are as follows:

- To investigate the extent to which barriers hinder the successful implementation of ICT in various school settings.
- Examining principals' leadership responsibilities and roles in ICT implementation contrasted across different contexts.
- To examine the critical management duties and functions principals perform in implementing ICT in various school environments.

- To suggest strategies principals should use for successful ICT implementation across different school settings.

1.5 THE CLARIFICATION OF KEY CONCEPTS IN THE STUDY

The main concepts of this study are presented and clarified in this section.

1.5.1 Information and Communication Technology (ICT)

ICT consists of various technologies that provide access to information via telecommunications (Tamilselvan & Sivakumar, 2019:23). ICT is similar to information technology (IT) but focuses on communication technologies, the internet, wireless networks, cell phones, etc. Using ICT in teacher training programmes leads to improvement in the quality of teachers for teaching effectively (Azhar, Hosam & Ahmed, 2022:300; Ratheeswari, 2018:45).

1.5.2 School

A school is a location for teaching and learning in the context of education (Makgati & Awolusi, 2019:50).

1.5.3 School principal

The school principal is a crucial educational leader who manages daily operations, ensures a safe learning environment, and collaborates with teachers, learners, parents, and the community. The principal sets the school's vision, implements policies, fosters a positive culture, and promotes academic excellence (Shava, Heystek & Chasara, 2021:119; DBE, 2016).

1.5.4 ICT implementation

ICT implementation involves integrating new ICT systems into an organisation or educational setting by utilising networks, hardware, software, and other technical resources to accomplish specific tasks or to improve current procedures. This is done

through planning, installation, configuration, testing, training and maintenance to ensure effective adoption and use (Bisong, Nkanu, Imoke & Akpo, 2023; Abdulrahaman, Faruk, Oloyede, Surajudeen-Bakinde, Olawoyin, Mejabi, Imam-Fulani, Fahm & Azeez, 2020:3).

1.5.5 ICT integration

ICT integration is the process of smoothly integrating ICT into a variety of organisational and educational functions, curricula, or activities (Dele-Ajayi, Fasae & Okoli, 2021:1). Integration is the methodical application of ICT resources and tools to improve communication, expedite administrative procedures, advance teaching and learning, and promote innovation (Avancena, Cabeza, Bordario & Lopez, 2023:49). ICT integration attempts to include technology into organisational culture, instructional methodologies and daily workflows so that stakeholders may use it wisely to accomplish their goals and objectives (Hasas, Enayat, Hakimi & Ahmady, 2023:38).

1.5.6 Technology

Technology is defined as “a system created by humans that uses knowledge and organisation to produce objects and techniques for the attainment of specific goals” (Volti, 2020:6). Educational technology refers to tools, resources, and digital platforms used to improve teaching, learning, and administration, including devices, software applications and online platforms designed to support and facilitate learning (Agar, 2020:381; Warner, Bell & Odom, 2018:2). In the context of this study, technology refers to devices such as computers, tablets, software and online platforms.

1.5.7 E-Learning

E-learning delivers educational content and streams learning processes via ICT. It entails enhancing teaching and learning opportunities at educational institutions using digital resources like computers, the internet, software, and other electronic devices (Mashau & Nyawo, 2021:125). In this research, e-learning uses electronic technologies such as computers and the Internet to facilitate teaching and learning.

1.5.8 Teaching

Rajagopalan (2019:5) describes teaching as “an interactive process, primarily involving classroom talk that occurs during certain definable activities between teacher and learner”. ICT integration teaching is how teachers use digital tools and resources to improve learners' learning outcomes. The pedagogical techniques that use technology to make learning settings for learners interesting and dynamic (La Fleur & Dlamini, 2022:9).

1.5.9 Learning

Learning is the continuous process of gaining new information or abilities, which teachers support through applying strategies such as attitude modification, skill development and knowledge of scientific principles in a classroom setting (Munna & Kalam, 2021). In terms of ICT, learning is the acquisition of knowledge, skills, and competencies through digital tools and resources, facilitated by the integration of ICT in schools, utilising interactive platforms like online courses, virtual classrooms, educational apps, and multimedia content (Haleem et al., 2022:277).

1.5.10 Leadership

Leadership may be defined as a process of social influence in which a leader requires the subordinates' willing participation to achieve the organisation's goals (Nedelcu, 2018:329). Leadership in implementing ICT in schools involves school principals directing, motivating, and assisting in successfully integrating technology into the learning environment. This consists of articulating a vision for ICT improvement, fostering a culture of support, and providing teachers with necessary tools and professional development opportunities (Banoglu, Vanderlinde, Çetin & Aesaert, 2023:70).

1.5.11 Management

Management is a strategic influence on an organisation's market, production and resource operations, addressing both people and non-people issues through anticipatory norm-setting or situational intervention (Ramakrishnan, 2022; Kaehler &

Grundei, 2018:22). Regarding the management of ICT, this process involves planning, coordinating and organising resources to integrate ICT in schools effectively. The management process involves strategic planning, decision-making, resource allocation, progress monitoring, and outcome evaluation to maximise the use of technology for educational objectives (Sosa-Díaz, Sierra-Daza, Arriazu-Muñoz, Llamas-Salguero & Durán-Rodríguez, 2022:2).

1.5.12 Clarification of terminology

It should be noted that this study lends itself to various concepts in management and leadership. These concepts are being used interchangeably in the literature. For example, leadership is sometimes called leadership theory, approach, or style. The researcher aimed to use consistent terminology throughout the thesis; hence, she opted for the terms management theory and leadership theory.

1.6 CONCEPTUAL AND THEORETICAL FRAMEWORK OF THE STUDY

This study will be guided by both a conceptual and a theoretical framework. Using a conceptual and theoretical framework in a study can help provide a strong foundation for the research and ensure the study is well-grounded and theoretically robust. Mensah, Frimpong, Acquah, Babah and Dontoh (2020:54) state that the overall aim of the two frameworks is to make research findings more meaningful and acceptable to the theoretical constructs in the research field while also ensuring generalisability. They assist in stimulating research while ensuring the extension of knowledge by providing direction and impetus to the research inquiry.

Conceptual and theoretical frameworks are both used because the conceptual framework aids in developing a clear understanding of the topic, while the theoretical framework, on the other hand, provides an overview of the theories employed (Luft, Jeong, Idsardi & Gardner, 2022; Adom, Hussien & Adu-Agyem, 2018). Through this approach, the researcher aimed to promote scientific diligence and depth in the analysis of the findings. They also enhance the empiricism and rigour of the research (Mensah et al., 2020).

1.6.1 Conceptual framework

This study focuses on the role of the principal in ICT implementation. This role can be divided into a management role and a leadership role. The management role encompasses tasks and sub-tasks such as planning, organizing, leading, and controlling to accomplish goals (Gutterman, 2023; Simons, 2019). These concepts provide a clear and structured framework to organise and analyse the data related to the management role of the principals concerning ICT implementation. These concepts have, therefore, formed the backbone of the study's conceptual framework and are perceived as a valuable approach for presenting the data in a meaningful way. Following Maxwell's (2005:35) advice , the conceptual framework was built from scratch instead of starting with a ready-made structure. Chapter 2 (cf. 2.7) presents a more detailed outline of the conceptual framework.

1.6.2 Theoretical Framework

The principal needs to fulfil a leadership role as well. This conceptual framework will be supplemented with what Luft et al. (2022) and Svinicki (2010:5) describe as an interconnected set of ideas (theories) about how a phenomenon functions or is related to its parts (the theoretical framework). ICT implementation requires a focus on instruction. Therefore, the instructional leadership theory was deemed relevant as a leadership theory for the study. Abdul (2020) and Geir (2013:115) assert that using ICT for teaching and learning in schools, particularly the management of ICT for instruction, learning, and other associated aspects, is the primary focus of school leaders' leadership. As instructional leaders, principals oversee the school's future direction, guarantee that schools function as professional learning communities, and drive ongoing curriculum implementation improvement (DBE, 2016:9).

ICT implementation requires significant changes in schools' operations, and teachers accept the technology. Therefore, the study also utilised the transformational leadership theory, focusing on inspiring and motivating teachers to work towards common goals and vision (Saad Alessa, 2021). As transformational leaders, school principals encourage technology adoption, push their teachers to exceed expectations, and create a shared vision for school reform to promote improvements and change (Ferguson, 2021). School leaders are pivotal in implementing technology

and demonstrating transformational leadership approaches (Schmitz, Antonietti, Consoli, Cattaneo, Gonon & Petko, 2023).

The instructional and transformational leadership theories were deemed suitable for the study, as they adhere to what Luft et al. (2022) and Adom et al. (2018:439) tell us to keep in mind, “The selection of a theoretical framework requires a thorough understanding of the problem, purpose, significance, and research questions of a study”. Chapter 3 (cf. 3.2.3 & 3.2.4) describes the study's theoretical framework in detail.

1.7 THE RESEARCH METHODOLOGY

The methodology for the thesis will briefly be discussed in the next paragraphs. A more comprehensive discussion will follow in Chapter 4.

1.7.1 The research paradigm

Research paradigms are defined by Ugwu, Ekere and Onoh (2021:19) and Creswell (2014:5) as broad research approaches and include specific methods. In this study, we will take an interpretive (qualitative) research approach. Interpretive research seeks to make sense of situations from the perspective of social members. Our comprehension of how people interpret the environments in which they live and work will deepen (Junjie & Yingxin, 2022:11; Walliman, 2016:175; Bertram & Christiansen, 2014:26). This paradigm is considered appropriate for the research since the goal is to investigate and comprehend the viewpoints, opinions, and experiences of principals, SMTs, and other teachers involved in ICT deployment.

1.7.2 The research design

Comparative educational technology is defined as the process of identifying and synthesising the similarities and differences in the theory and practice of education across countries, regions, and nations to promote the development and growth of learning (Rodriguez-Segura, 2020; Hamidia, Ghorbandordinejadb, Rezaee & Jafari, 2011:374). Regarding the preferred method for comparative studies, the majority agreement is that no methodology is peculiar to comparative research (Iranifard &

Latifnejad, 2022:3318). Researchers studying various facets of education utilise the same research techniques as comparativists. As such, they have access to a vast array of well-established research methodologies in the field of education, to which they must then add methods tailored to the particular goal of comparison (Zajda & Rust, 2021). Magrath, Aslam and Johnson (2019:9) agree that there are different approaches in comparative research, each with advantages and limitations.

The primary goal of this research was to examine and gain a deeper comprehension of the principals' roles in implementing ICT. One of the study's objectives was to examine how principals from quintiles 1, 2, and 3 schools carry out their duties concerning those from quintiles 4 and 5. Contrary to popular belief, comparative education does not only include studies that compare two or more different nations. Historically, scholars in this domain have frequently shunned these methods in favour of concentrating on a single country (Shahjahan, Estera, Surla & Edwards, 2022). The majority of research on comparative education is comprised of single-unit studies or studies that concentrate on a single educational system (Shrestha & Bhattarai, 2021:75). In line with this argument, this study aims to focus on one system of education. Miri and Zohreh (2019:1) explain that comparative studies focus on the similarities and differences between analysis groups; in other words, they compare. In this study, the “groups of analysis” refer to quintile 1, 2 and 3 schools on the one hand and quintile 4 and 5 schools on the other. A comparison will be made in this study to investigate barriers that hinder implementation in various school settings. This study compared the principal’s leadership role and management duties and suggest strategies principals should use in the different school settings. Therefore, the design adopted for this study was the multiple case study design.

1.7.3 The research environment and population

The research population was selected purposefully from nine primary schools in the Motheo and Xhariep Districts in the Free State. Five quintile 1-3 schools and four quintile 4-5 schools were selected because these would enable the researcher to compare ICT implementation in different contexts. Furthermore, the selection was based on the premise that these schools have ICT resources for teaching and learning. Nine principals and fifty-six teachers formed part of the study. They were

purposefully selected. The purposeful selection technique is widely used in qualitative research to select and identify the most information-rich cases. It makes use of a process by which individuals who have special knowledge or experience about a phenomenon of interest are identified and selected (Campbell, Greenwood, Prior, Shearer, Walkem, Young, Bywaters & Walker, 2020; Gisbey, 2015:8). The researcher attempted to include at least one teacher per grade, from Grades 1-7, to participate in the study. If this target were to materialise, seven teachers from each school would form part of the study, totalling 70 participants.

1.7.3.1 Ethical considerations for the study

Trustworthiness in research not only engages participants responsibly but also observes ethical measures. Ethics is a set of moral principles that ensures the most correct conduct towards respondents (Ederio, Inocian, Calaca & Espiritu, 2023:2717; McMillan & Schumacher, 2010:334). Permission to conduct this study was obtained from the University of the Free State's Ethics Committee and the Free State Department of Education. Prospective participants were informed about the proposed research and its potential value. Participation was voluntary, and all information was obtained anonymously to ensure confidentiality. Informed consent was requested from all the participants.

1.7.3.2 Data collection methods and procedures

Data were collected using group and individual interviews, observation, and document analysis.

1.7.3.3 Semi-structured individual interviews

The principals of all selected schools were engaged in semi-structured individual interviews. Individual interviews are mostly perceived as a time-consuming data collection method. Nevertheless, this was considered most appropriate for capturing data from the principals who were selected as respondents in this study because they were expected to be the driving force behind ICT implementation and were presumed to have a deep understanding of the issue under investigation (Byrne, 2022; Creswell

& Poth, 2018:188). Questions focused on their role as leaders in ICT implementation, contextual issues, and the support they received from other stakeholders.

1.7.3.4 Focus-group interviews

A focus-group interview may be described as a small group, consisting of six to ten people, engaging in collective discussion of a topic previously selected by the researcher (Taherdoost, 2021:18; Edwards & Holland, 2013:36). Focus-group interviews were conducted with ICT coordinators and teachers, to determine how ICT is used and what kind of challenges they experience with the implementation of ICT.

1.7.3.5 Observation

Observation as a data collection method involves watching and recording the behaviour, actions, or events of people, objects, or phenomena in their natural or controlled settings (Lofland, Snow, Anderson & Lofland, 2022). This technique is commonly used in qualitative research to gather first-hand information about the research topic. Researchers observe, take notes, and sometimes record video/audio to collect data accurately (Goldkuhl, 2019). Using an observation sheet, the researcher recorded the ICT equipment in the school and determined whether it was used at schools as part of ICT implementation.

1.7.3.6 Documentary analysis

In document analysis, both printed and electronic documents are examined and evaluated. As with other qualitative research methods, document analysis aims to gain meaning, understanding, and empirical knowledge from data (Morgan, 2022:64; Bowen, 2009:28). A crucial component of a document analysis exercise is selecting the appropriate documents. Researchers risk discrediting their studies if they do not check for authenticity, credibility, representativeness, and meaning (Morgan, 2022:71). The researcher collected the ICT policies of the schools to evaluate whether they incorporated the necessary content and guidelines for the implementation thereof.

1.8 QUALITY ASSURANCE OF THE RESEARCH

In qualitative research, trustworthiness is significant, as it tells one how reliable the gathered qualitative data are (Stahl & King, 2020; Nieuwenhuis, 2008:113). This study adhered to the principles of trustworthiness, which include, according to Daniel (2019:101), issues related to credibility, transferability, dependability, and confirmability. In short, these criteria refer to the following notions:

Credibility implies that the research participants will perceive the research findings as authentic and an accurate account of what transpired during the study (Daniel, 2019:103; Kumar, 2011:169). During the interviews, open-ended questions were posed so that participants could respond in their own words. Participants can answer questions accurately when they understand the language used during the interview. The responses and experiences of participants were recorded accurately and unambiguously. Additionally, the researcher used terms that everyone understood. Concepts were described without using unnecessary or excessive terms. Questions were precise, and ambiguities were avoided.

Dependability derives from the repeatability of a study, also referred to as consistency (Riazi, Rezvani & Ghanbar, 2023:5; Korstjens & Moser, 2017:122). The audit trail records and documents a researcher's decisions and choices regarding a study's theoretical and methodological aspects.

Transferability refers to the degree to which the results of qualitative research can be transferred to other contexts with other respondents (Daniel, 2019:103; Anney, 2014:277). This study ensured transferability by collecting biographical information about participants, including age, gender, teaching experience, teaching with technology, and experience of being a principal.

Confirmability concerns the aspect of neutrality, which means that the inter-subjectivity of the data needs to be secured (Korstjens & Moser, 2017:122; Lapa, 2012:29). The researcher in this study ensured confirmability by being aware of and eliminating any partiality to avoid twisting participants' responses. The research objective and purpose were thoroughly discussed with participants before the study began to ensure confirmability. Further, detailed records of how the information was collected and how the study's findings were derived were provided.

1.9 SIGNIFICANCE OF THE RESEARCH

The research is deemed necessary because it has the potential to contribute to the knowledge base of ICT implementation and be of great value to educators, principals, subject advisors, circuit managers and policymakers in the following ways:

- It will provide insight into how barriers hinder the successful implementation of ICT in various school settings.
- The study will help better understand the critical leadership duties and functions principals perform in implementing ICT in various school environments.
- The study will help better understand critical management duties and functions principals perform in implementing ICT in various school environments.
- By comparing the roles of principals in different school settings, this study will help identify and describe best practices, which factors contribute to the variation in principals' ICT capacities, and how these factors impact the effectiveness of ICT implementation in diverse settings.
- The study will help recommend effective ways for principals to collaborate with teachers to implement technology successfully across different school contexts.
- This study will contribute to the knowledge base by recommending strategies principals should use for successful ICT implementation across different school settings.

1.10 DEMARCATION OF THE RESEARCH

This study was limited to nine primary schools in the Motheo and Xhariep districts in the Free State. Participants included the nine school principals and fifty-six teachers from participating schools. Grades 1-7 teachers were used to conduct this research.

1.11 LIMITATIONS OF THE RESEARCH

The study was limited to the role of school principals in implementing ICTs in nine selected primary schools in the Free State. The study covered selected primary schools with ICT infrastructures in the Free State; hence, the findings may only be generalised to similar schools. However, multiple data sources were used to ensure the results were valid and valuable to the research context. The study cannot be

entirely free of bias or subjective standpoints. According to Aspers and Corte (2019:156), to guard against bias, various data sources and verified responses during the data analysis and interpretation stages in quantitative and qualitative research should be used. There is no guarantee that participants in the study were entirely honest in their reflections and reports. However, multiple data sources and analysis techniques were used to obtain quality results.

1.12 LAYOUT OF CHAPTERS

The structure of the research study is set out below.

Chapter 1 introduces the research project and states the overall argument for why the study was undertaken. It presents the background, primary, and secondary research questions. This is followed by the formulation of the aim and objectives of the study and the research methodology used to respond to the research questions and achieve the research aim. The chapter concludes with a description of important terms related to the study.

In **Chapter 2**, the conceptual framework adopted for the study is outlined. The literature review focuses on the concepts and purposes of ICT implementation in schools. Also included are historical developments, international perspectives and policies related to school ICT implementation. This is followed by a discussion of the nature of the principal's management role. Finally, the chapter concludes with a discussion of the conceptual framework and perspectives on what the role of the principal entails in terms of management of ICT implementation.

In **Chapter 3**, the theoretical framework adopted for the study is outlined. The literature review provided in Chapter 3 focuses on leadership theories, including instructional and transformative leadership theories. The literature on these theories is aligned with ICT implementation in schools across different school contexts. As a result, the literature also encompasses the contextual obstacles that principals must navigate.

Chapter 4 presents the nature of the research, the research paradigm, and the research design of a multiple case study. Additionally, the chapter focuses on the research approach: the qualitative research, the descriptive approach, the selection of participants, and the ethical considerations. These aspects are followed by explaining

the methods for collecting data, ensuring the research is trustworthy, and analysing the data.

The findings of the empirical research are reported in **Chapter 5**. The data gathered from the interviews, observations and documentary analysis is presented and analysed in this discussion. The findings are analysed, discussed, presented, and interpreted by the study's goals to address the primary and secondary research questions.

The findings of the investigation and the recommendations arising from the study are outlined in **Chapter 6**. The study's conclusions are discussed as they relate to the research questions. Recommendations that might encourage effective management of the implementation of ICT integration in schools are presented, and suggestions for further research are made.

1.13 SUMMARY OF THE CHAPTER

Chapter 1 has outlined the reasons for which this study was undertaken in the introduction and background of the project. Contextual and theoretical frameworks were included to highlight the nature of the study. The purpose of the study was illuminated in the formulation of the primary and secondary research questions. The study's research design, methodology, data collection and analysis methods, and the reasons for their selection were also discussed. Furthermore, the chapter discussed the ethical considerations in terms of participant confidentiality and the protection of data. An overview of the entire study is briefly presented in this chapter in the overall chapter outline. In the next chapter, the study's literature review will present existing knowledge and contextual and methodological contributions.

CHAPTER 2
LITERATURE REVIEW PART 1 AND THE CONCEPTUAL FRAMEWORK OF THE STUDY

2.1 INTRODUCTION

This first literature chapter aims to conduct a comprehensive literature review to establish the key themes and issues in debates regarding implementing ICT in schools. The emphasis is on the role of the principal. The literature review defines and describes how ICT implementation in schools has evolved and developed in countries such as the United States of America, Norway, Australia, South Korea, Germany, African countries, China, India, the Russian Federation and Turkey. Investigating international perspectives enabled the researcher to reveal gaps in the literature, as well as areas that have been understudied. This, in turn, helped me understand the broader significance of the topic. The chapter also focuses on essential policies related to ICT implementation and the nature of principals' management roles. Lastly, the conceptual framework that guided the research questions is discussed.

First, however, a brief overview of the need for ICT implementation in schools is presented. This section is not directly related to the research questions. The idea was to demonstrate the importance of technology in education and its positive impact on learners, teachers, and the school community. The role of the principal as the accountable person is vital in ensuring efficient ICT implementation.

2.2 ICT IMPLEMENTATION IN SCHOOLS: A 21ST CENTURY NEED IN CLASSROOMS

ICT involves using telecommunications to facilitate access to information. According to Ratheeswari (2018:45), by using mobile phones, wireless networks, and the internet, ICT is being used to raise the standard of instruction in schools (Haleem, Javaid, Moh, Qadri & Suman, 2022:276). Over the past fifty years, technology has significantly impacted education. Technology impacts significantly on teaching and learning, enhancing the use of various methods like educational videos, simulations, data storage, databases, mind-mapping, guided discovery, brainstorming, music, and

the internet, making its use a valuable 21st-century skill for learners (Latorre-Cosculluela, Suárez, Quiroga, Sobradiel-Sierra, Lozano-Blasco & Rodríguez-Martínez, 2021:191). When using educational technology, though, the focus should be on how well it assists in acquiring knowledge, whether the tool interacts with the user, and whether it produces positive results (Osuji & Pepple, 2019:25). Alhumaid (2019:11) states that teachers are urged to include technology into their lessons as much as they can. Since technology-enhanced learning has flourished recently, learners who are already tech-savvy have become enthusiastic about subjects where technology is integrated into the curriculum. ICT can also enhance learner-teacher interaction, resulting in a more efficient learning process. ICT can also increase learner interest by offering multiple audio and visual learning options.

2.3 BENEFITS OF ICT-RELATED INSTRUCTION IN CLASSROOMS

There are various advantages associated with ICT in the classroom. The following paragraphs aim to alert the reader to these critical classroom aspects. Leading instruction in the classroom is one of the principal's primary responsibilities (Sharif, 2020:662), and this discussion aims to draw attention to some of the issues that need to be considered.

2.3.1 Exposure to a variety of technology learning tools

For Haleem et al. (2022:277), technology-enhanced learning tools such as smartboards, tablets, laptops, mobile devices, simulations, and dynamic visualisations have improved education. Engagement and interest help learners retain information better when they use technology. Active participation in the classroom is one of the most important factors for increased knowledge retention (Osuji & Pepple, 2019:27). With the growth of these communication systems, teachers and learners have access to a world beyond the classroom (Goh & Sigala, 2020:158; Chisango & Marongwe, 2018:2).

2.3.2 The skillset of teachers in enhancing ICT

Vidhate (2019:2) claims that ICT-trained and digitally literate teachers can develop learners' higher-order thinking skills, help learners express their understanding creatively and individually, and prepare them for technological change in society and the workplace. Lauricella and Jacobson (2022:2) emphasise the importance of teachers utilising educational technology in their classrooms through various approaches. Makgati and Awolusi (2019:51) say teachers can access forums and blogs to improve their skills. Technology allows teachers to improve themselves with online resources. Teachers can enhance traditional teaching methods by utilising apps or online resources like virtual lesson plans, grading software, and online assessments to save time (Osuji & Pepple, 2019:28). Enu, Nkum, Ninsin, Adoma and Korsah (2018) assert that effective computer use requires both teachers and learners to possess the necessary skills and attitudes. Some critical skills that teachers should have to enhance ICT in education include word processing, spreadsheet database management, electronic presentation, internet navigation, email management, networking, and touch typing (Enakrire, 2024). Vidhate (2019:3) emphasises the importance of training school principals, ICT coordinators, teachers, and decision-makers in ICT usage to support teachers.

2.3.3 Enhancing the effectiveness of learning

Using ICT in the educational sector promotes learning (Alenezi, 2019:222). This can be done in various ways. Garg (2021:1), for instance, suggests that ICT may be a significant motivator in learners' learning. ICTs are reportedly accelerating educational change in all learning institutions, according to a study by Barakabitze, Lazaro, Ainea, Mkwizu, Maziku, Matofali, Iddi and Sanga (2019:3). Apsorn et al. (2019:641) point out that, nowadays, it is easy to access information anywhere, anytime. Wulansari, Fajri and Qonaatun (2020:204) add that by providing access to the internet in schools, learners will no longer have to rely entirely on their teachers.

Information technology improves our data accuracy, and we collect more data. Using IT to enhance teaching and learning skills is beneficial. According to Prasanthi and Rajani (2022:4233), technological advancements have made audiovisual training easier. Education resources are being expanded and widened, allowing learners to

use computers for various educational purposes. Technology aids learners in recalling information, receiving new stimuli, activating responses, receiving feedback, practising appropriately, sequencing learning, and finding viable information sources while fostering a positive attitude toward technology tools (Pandita & Kiran, 2023:1; Enu et al., 2018:36). Technology can be used to enhance and increase learning in five different ways. By facilitating project-based learning and real-world issues, technology can (i) improve relevant, engaging learning and (ii) organise it; by bridging the digital gap, it may (iii) go beyond the classroom, (iv) offer possibilities outside of the classroom and (v) support learners in pursuing their passions (Mabe, Brown, Frick & Padovan, 2022).

2.3.4 Making a significant difference in teaching and learning styles

A nation's progress depends on its ability to promote constructivist pedagogy and learner accountability, which are fostered via ICT-enhanced learning settings that encourage active, collaborative, creative, integrative, and evaluative learning (Kumari, 2021:589; Gaurav, 2018:251). Technology in education, through interactive materials, enhances learners' motivation and facilitates skill acquisition, potentially changing teaching methodologies (Taylor, Fudge, Mirriahi & de Laat, 2021; Enu et al., 2018:36). According to Osuji and Pepple (2019:27–28), educational technology allows learners to examine complex material at their own pace and move ahead if needed. A more productive method of teaching or learning is possible through the effective use of technology (Haleem et al., 2022:279). Henderson (2020:52) highlights the potential of technology in teaching methods like gamification and virtual field trips, promoting active participation in the learning process.

2.3.5 Effective communication of information

The ability to communicate information anywhere, anytime, makes social media sites an excellent source of networking opportunities (Haleem et al., 2022:275). Apsorn et al. (2019:641) confirm that communication through a network is accessible. Thanks to technological advancements, our age of computers and online networks has made it possible for anyone to learn anytime, anywhere. New technology is often incorporated

into long-standing work and home routines without causing significant disruptions (Prasanthi & Rajani, 2022:4233).

2.3.6 Summary: Benefits of ICT-related instruction in classrooms

ICT-related instruction refers to using information and communication technologies (ICT) in educational settings to facilitate teaching and learning processes (Haleem et al., 2022:276). It involves the integration of digital tools, such as computers, tablets, software applications, and the internet, to enhance the delivery of educational content, communication between teachers and learners, collaboration among peers, and overall learning outcomes (Molotsi, 2022:2). By analysing the above-mentioned interpretations of ICT offered by various scholars, one can agree that there are six general advantages of ICT-related instruction in classrooms:

They are:

i. sharing knowledge;
ii. enhancing the skills of teachers in their perspective areas;
iii. enhancing the effectiveness of learning or adding a new dimension to learning;
iv. enhancing the quality of education and training;
v. making a significant difference in teaching and learning styles; and
vi. communicating information more effectively.

The instructional leadership role of principals is to provide leadership and ensure that instruction is offered at an acceptable standard. Knowledge of the advantages of ICT-related instruction is therefore imperative. This aspect will be critically discussed in the section on the principal's instructional leadership role (cf. 3.2.3).

2.4 ICT IMPLEMENTATION ACROSS DIFFERENT SCHOOL CONTEXTS: SOME INTERNATIONAL PERSPECTIVES

This section focuses on the stance of ICT implementation across different school contexts. School contexts depend primarily on the type of country in terms of development, with developed countries typically having well-established education systems with extensive resources and infrastructure. On the contrary, developing countries may face limited funding, overcrowded classrooms, and a lack of access to

quality education. It is important to note, though, that disparities may be evident in developing countries as well, with South Africa being an excellent example, with the country's school system being divided into quintiles 1-3 (with challenges similar to those of developing countries) and quintile 4-5 (which are associated with more affluent contexts). This discussion aims to improve our understanding of each context's challenges and opportunities.

Schools in South Africa are categorised in terms of quintiles. Schools in the poorest (most economically deprived) geographic areas are categorised as quintiles 1, 2, and 3. In contrast, those in the wealthier (more economically privileged) geographical areas are categorised as quintile 4 and 5 schools, according to Plaatjies (2020). The comparison of schools in developed countries as opposed to those in lesser developed countries is highly relevant for this study, as the South African school context is, in effect, an example of two education systems: one developed (quintile 4 and 5) and the other less developed (quintile 1-3). Also, within developed countries, not all schools are equal in context. Many schools in developed countries are also located in areas characterised by the stark realities of poverty. Following the central theme of the study, the researcher searched for any literature that mentioned the principal's role in ICT implementation and different school situations, which were the topics of the comparison.

2.4.1 Developed countries

Among the developed countries where ICT has been steadily advancing, **American** schools are increasingly adopting online education, with 92% having one or more computer laboratories, highlighting the rapid growth of virtual schools in the US (UNESCO, 2022:49). The US Department of Education's National Education Technology Plan (NETP), published in 2017, aims to prepare learners for complex educational settings requiring effective technology use. Classrooms and independent learning environments are using interactive whiteboards more and more, with virtual learning situations, instructional computer games and an increased reliance on internet-based applications such as email (Gomez, Trespalacios, Hsu & Yang, 2021:163; Shin, 2018:1306-7; Livingston, 2012:10). According to Burns (2011:46), the US has taught us a lot in educational technology.

- First, the United States has invested significantly in technology-related teacher professional development.
- Second, in the assessment field, from grades 3-12, a national high-stakes testing system has radically altered the educational landscape.
- Third, technology is integral to all US schools.

Thannimalai and Raman (2018:205) indicate that school principals in the US communicate information technology-infused strategic plans aligned with shared goals. They also have similar ideas about how technology may promote change and elevate greatness.

Norway and the United States of America are among the five most digitalised countries (European Commission, 2020). The government has, since 2016, charted a digital-by-default communication and public services strategy (Hatlevik, Radtke & Utgård, 2023:8). Norwegian secondary schools began offering ICT as an elective subject in the 1980s, and national plans have since included it in schools. The 1996-1999 plan focused on technology, while the 2000-2003 plan aimed to increase digital competence. Digital tools and resources were identified as a fundamental competence area for all learners. A framework of competencies for digital skills was presented in 2012 (Thorvaldsen & Madsen, 2020:5283). Digital technology has transformed the education system and society for the past 10-20 years (Frønes, Pettersen, Radišic & Buchholtz, 2020:145). The Norwegian education system included digital skills as a fundamental skill as part of the Knowledge Promotion reform (Arstorp, 2021:1). As a result of Norway's digital-rich educational environment, learners can access a wide range of educational resources at home (Thorvaldsen & Madsen, 2020:5282). Using laptops in the classroom, learners can access various options.

Furthermore, learners can access applications that can help them to study better. Using computers can also help learners concentrate better on more challenging problems, which increases their progress (Ng, Leung, Su & Chu, 2023:138; Stakkestad & Størda, 2017:5). In Norway, principals' primary role is to create teaching and working conditions that facilitate pupils' learning. By stimulating teachers in their work and ensuring their professional development, pedagogical roles enable learners to achieve the objectives of the national curriculum. Among the principal's responsibilities are developing local curricula and providing study materials. The

principal is also responsible for providing opportunities for teachers to develop their professional skills (Mthanti & Msiza, 2023:2; Petersen, 2014:302).

Australia has been incorporating information communication technologies (ICTs) since the 1980s to enhance learner learning, improve engagement, and enhance school performance, according to McCahey, Allen and Arslan (2021). The integration of information and communication technologies (ICTs) in education occurred in three waves in this country: 1980s-1990s, 1990-2000, and post-2000, with teachers recognising its potential in various learning areas (Jamieson-Proctor, 2018:21; Norton & Wiburg, 2003). In September 2015, the Australian Curriculum, Evaluation and Reporting Authority approved the use of technology for all learners (Australian Curriculum, Evaluation and Reporting Authority, 2017).

A critical factor in improving schools in Australia has been ICT. The government has invested millions of dollars in ICT-enabled infrastructure in elementary schools (Thorpe et al., 2015), and according to Thomson (2015:1), learners' use of computers was expedited between 2008 and 2012 in Australia under the National Partnership Agreement on Digital Education Revolution (DER). Principals in Australia implemented interventions to enhance success, promoting involvement through workshops, hands-on activities, release time, and collaboration with teachers. They are also active in ICT decision-making processes (Banoğlu, Vanderlinde, Çetin & Aesaert, 2023:71).

South Korea has supported Ed-tech and promoted 21st-century skills for more than 30 years (Marrone, Van Sebille, Gabriel, Kovanovic & De Laat, 2021:52). Throughout South Korea, there have been six ICT master plans since 1996, which provide schools with ICT infrastructure and support ICT-based instruction through curriculum reforms and teacher education (Jinhee, Sejin & Young, 2022:165). In this country, the education system has experienced rapid improvements since the mid-20th century. Computers and other technologies have been integrated quickly into curricula in South Korea since 2002, with nearly all classrooms connected to high-speed internet. The Ministry of Education announced a SMART Education Plan (Jeong, 2020:76; Grzybowski, 2013:4) to reflect 21st-century changes and to digitise the entire school curriculum by 2015. The Korean government hopes to improve efficiency and creativity in education by making SMART Education widely available (Choi, Chung & Ko, 2021:9). Other nations have had the chance to learn from South Korea due to its early

efforts and initiatives in integrating ICT into education (Ozturk & Tinmaz, 2019:448). A study by Çiçek (2019:273) found that principals in South Korea provided ICT infrastructure, allocated budgets, and encouraged teachers to use ICT in classrooms to meet the educational requirements.

In the 1990s, **China** integrated ICTs into education, increasing training and implementing technology across all departments, including in rural areas (Wang, Liu & Zhang, 2018:195). Zeng (2022:1) states that the development of basic education has always been a priority for China in keeping up with international trends. The Chinese basic education system is among the largest in the world. China's promotion of new technologies to bridge learning gaps, particularly in rural areas, dates back to early twentieth-century efforts to modernise education (Zeng, 2022:1059; Schulte, 2015:1). To move ICT for education from theory to practice, China launched the first national initiative in terms of which the Chinese government has built thorny, soft, and human infrastructure to expand quality education to rural areas, having recognised both the power and challenges of ICT (Bajpai, Biberman & Ye, 2019:7). ICT education infrastructure investment by the Chinese government has increased over the last few decades to promote development (Agbebi, Xue & Yu, 2021:3; Lu, Tsai & Wu, 2015:259). Since the 1990s, China has launched several ICT integration projects aimed at strengthening national and regional networks and significant infrastructure improvements have been made since 2000, through projects like the School Network Popularization, Class Network Popularization, and Distance Education in Rural Areas, involving nearly 6000 principals and teachers in 2019 (Zeng, 2022:4). As a result of COVID-19, online courses have been greatly enhanced for self-education. China aimed to wirelessly equip half of all primary and secondary schools by 2020. Chinese teachers utilise ICT 96% of the time, with over 70% of schools having digital resources and 95.2% having multimedia classrooms (Dong, Qian, Bian & Qiao, 2021:54). In China, principals oversee ICT transformation, which includes implementing ICT infrastructure, fostering an innovative school culture, and modifying instructional strategies (Wu, Yu & Hu, 2019:1211).

ICT has been incorporated into **Turkish** policy since 1991. In 1984, the Ministry of National Education (MNE) introduced computers to secondary schools. Turkey's Tenth Development Plan 1 calls for action in education in response to the rapid changes in science and technology, including (i) improving educational quality by

integrating ICTs into the curriculum, (ii) reducing success gaps between school types and regions, and (iii) strengthening integration mechanisms between education and work (Karakan, 2023). Akyar, Yüksel, Bilgin, Şimşek & Demirhan (2019:192) and Aslan and Zhu (2015:24) claim that both developed and developing nations have incorporated ICT use extensively in education. Turkey's limited budget makes it imperative to implement ICT effectively and rationally in education despite substantial investments in ICT infrastructure, including ICT-related human resources, such as teachers. This transformation relies heavily on teachers. Guven (2019:106) discusses Turkey's culture of acceptance of ICTs in the context of a developing country. ICT adoption is, therefore, both a human and a technological process. Insufficient ICT infrastructure and low ICT literacy result in ineffective ICT use for adult educators. Founded in 2009, FATIH – Movement to Increase Opportunities and Improve Technology – provides computer equipment and interactive teaching tools. In addition to providing e-content for classroom and personal use, Karakan (2023), and Kizilet and Ozmen (2017:33) mention that the Turkish government promotes education through technology. The World Bank's Fundamental Education Project played a significant role in replacing blackboards with computers. Initially, the Ministry of National Education (MONE) planned to provide computers in every classroom as part of the FATIH Project (Akyar et al., 2019:192). Asli, Ozge and Mataruna-Dos-Santos (2019:431) state that FATIH has recently been implemented in nationwide schools. Principals and teachers must understand the power of technology to improve learner learning for this project to succeed. The project has been raised and understood through principals' efforts, teamwork, and assessment systems. The FATIH project in Turkey has transformed primary and secondary schools into ICT-integrated learning environments, incorporating devices like tablets and smartboards in contemporary classrooms (Tinmaz & Ozturk, 2019:447). As indicated by Banoglu et al. (2023:70), principals are responsible for aligning information and communications technology policies with the policies of district and central authorities, facilitating active communication, motivating learners to learn, and hiring and retaining technology-savvy teachers.

The following section (2.4.3) focuses on ICT implementation in developing countries.

2.4.2 Developing countries

ICTs in schools in developing countries have gained attention in the last decade. ICT integration impacts learning, but only if teachers understand that technology use requires new skills and pedagogical approaches to be effective (Dzinoreva & Mavunga, 2022:54). In the following paragraphs, the discussion focuses on ICT implementation in India, the Russian Federation, and African countries such as Kenya, Nigeria, Zimbabwe, and South Africa.

The first school broadcast in **India** was broadcast by radio in 1937. The Indian Department of Electronics and Human Resource Development collaborated in 1984-85 to introduce Computer Literacy and Studies in Schools (CLASS). Computers, textbooks, and instructors were purchased, sourced, and maintained through the 8th Five-Year Plan (1993-1998). Educomp launched India's EdTech journey, with EdTech start-ups first entering the market around 2010. Byju's became one of the top EdTech companies in 2019. Still, since then, many start-ups have emerged to challenge them (Dhawan, 2020:10). Since ICT boosts productivity and paves the way for economic growth, India invests heavily in this technology. ICT also improves economic agents' access to timely information and simplifies the organising, storing, and retrieving of information (Banerjee, 2014:4685). The following projects and schemes are described in Kundu (2019:50) as examples of those launched by the Indian government from time to time:

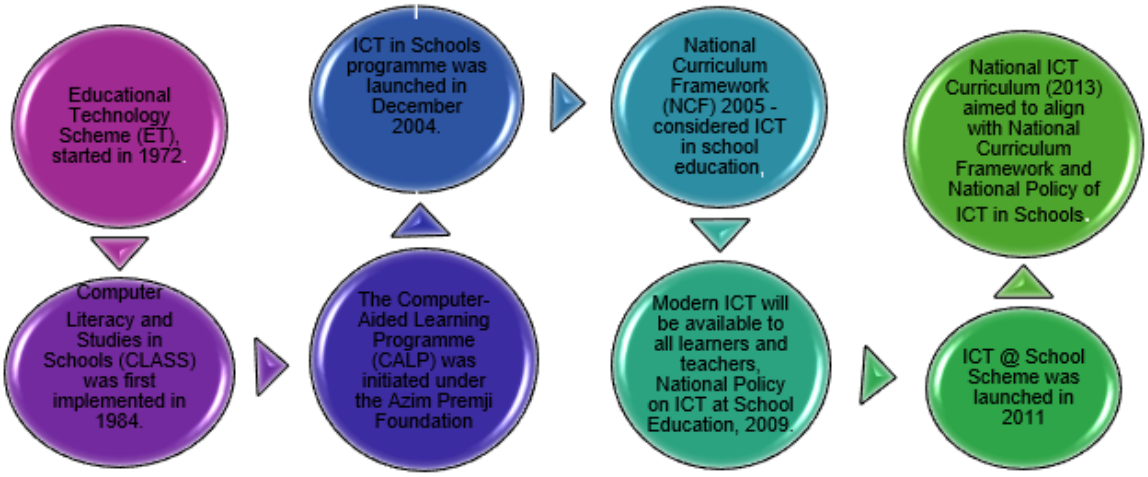

Figure 2.1: Projects and schemes launched by the Indian Government (Kundu, 2019)

India's *All* India *Council for Technical Education* (AICTE) has partnered with Microsoft to offer Microsoft's Learn for Teacher platform, providing teachers with industry-recognised curricula and certifications and enhancing digital literacy among teachers to bridge the digital divide (Sharma, 2021:10). The responsibility of a school principal in India is to improve efficiency and effectiveness in a variety of management functions, including administration, monitoring, evaluation, curriculum development, and infrastructure development (Singh, Steele & Singh, 2021). A key element in establishing technology as part of school culture is the ICT leadership of school principals (Okafor, 2023:1495).

As described by Gritsenko, Wijermars and Kopotev (2021:64), ICT development in **Russia** is a major national priority, including special education. For education to be more accessible and of higher quality, as well as to develop self-awareness, ICT is integrated into the education process. Imamov and Semenikhina (2021) note that since the mid-1990s, the Russian government has invested heavily in computerising education, developing telecommunication networks, and developing educational resources. RUNNet, a nationwide network of universities and research institutes, was launched within the Russian programme Universities of Russia to use ICT in education for the first time. Federal and regional programmes have connected RUNNet to tens of thousands of educational, research and cultural institutions. As a result of this infrastructure, educational institutions had access to Russian and foreign educational and research resources (Kovalev & Kuznetsova, 2016:8). According to Frey (2017:21), the Teaching and Learning International Survey (TALIS) found that:

- 69% of teachers allow learners to utilise ICT for class or project work;
- 69% received training on how to use ICT in the classroom (OECD 2019:6);
- on average, 72% of teachers felt prepared to use ICT;
- 75% of teachers attended professional development activities related to ICT for teaching and
- 32% of school principals report that a lack of adequate digital technology hinders quality instruction in their schools.

In Russia, the principal must assist teachers in integrating digital resources. In addition to exhibiting a desire to employ digital technologies in instruction, principals have a significant role in helping teachers (Jogezia, Koroleva & Baloch, 2023:4).

The late 2000s and early 2010s saw a shift in the adoption of ICT in Africa to foster digital possibilities and social inclusion through the development of capacity, empowerment, governance, and social involvement (Choi, Dutz & Usman, 2020). Today's industrial society relies heavily on ICTs. Science, technology, engineering, and mathematics (STEM) are increasingly being taught with ICT skills. Barakabitze et al. (2019:1) point out that ICTs have been integrated into several African teaching courses. There is a concern about ICT-based development for all of humanity. Bringing together policymakers, academics, and the private sector with ICTs can accelerate the achievement of the Education 2030 Agenda (UNESCO, 2022). According to Barakabitze et al. (2019:4), Akarowhe (2017) and Suliman, Fie, Raman and Alam (2008:1), ICT4E integration in Africa faces the following challenges:

- ICT infrastructure in educational institutions is inadequate.
- Teachers' attitudes, pedagogy, skills, knowledge, and beliefs regarding ICT.
- National education policies, plans, and curricula lack ICT.
- Projects involving ICT are not adequately supervised and executed.
- Insufficient financial resources.
- Instability in politics.

The African Union hopes to transform Africa into a "transformed continent" by 2063. Technology will significantly affect African society. In addition to the Fourth Industrial Revolution, blockchain, and artificial intelligence, Africa will be affected by many other developments (e-Learning Africa Report, 2019:3). Barakabitze et al. (2019:3-4) show that despite ICT integration in African education systems, adoption and expansion remain slow due to inadequate policies, infrastructure, teacher capacity, and financial resources. The eLearning Africa Report (2019:12) highlights discrepancies in access to technology across Africa, indicating disparities in access to eLearning tools. Nevertheless, eLearning initiatives are highlighted that are encouraging:

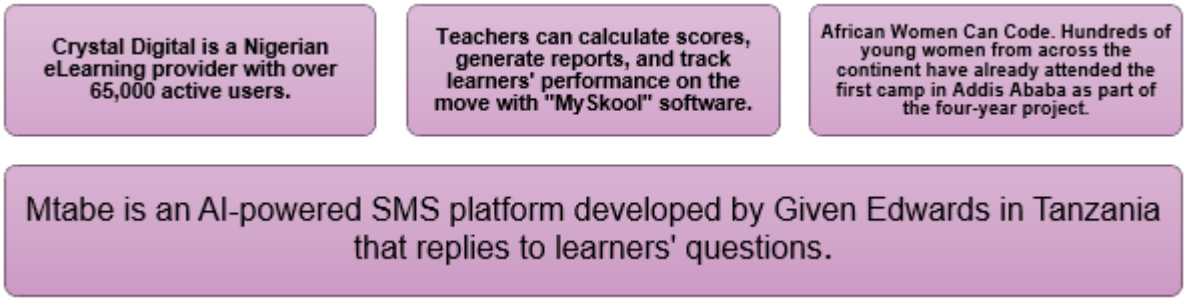

Figure 2.2: e-Learning initiatives (eLearning Africa Report, 2019:12)

A paradigm shift has occurred in many developing countries because of heavy investment in ICT integration. Kenya is one of these countries (Ngwacho, 2021:9; Mwendwai, 2017:408). The Kenyan government strongly emphasises integrating ICT and related infrastructure in pre-service training courses. Principals of Primary Teacher Training Colleges (PTTCs) are crucial in implementing this integration (Kiarie & Jones, 2024). According to Yamamoto and Yamaguchi (2019:48), leaders must engage actively in dynamically changing environments for a reform like ICT integration to be implemented successfully. It is the principal's responsibility to oversee innovations and changes in the school (Govindasamy & Mestry, 2022:3). Mwendwai (2017:408) asserts that the principal of a school oversees assigning funds to educational initiatives like the use of ICT as long as they supply and maintain the necessary equipment (Ministry of Education (MoE), Republic of Kenya, 2021:34). African countries are still in the beginning stages of integrating ICT into their education system, which puts them at risk of being left behind in technological advancement (Altbach, Reisberg & Rumbley, 2019).

South Africa's 2004 White Paper on e-education policy emphasised the government's commitment to providing computers and ICTs to public schools to improve learners' access to knowledge and information (DBE, 2004). According to Masango, Van Ryneveld and Graham (2022) and Mooketsi and Chigona (2016:3), South Africa has been working towards a paperless classroom for nearly two decades to prepare teachers and learners for the information age. ICT is part of the nation's National Development Plan 2030, which aims to enhance learners' learning capacity across all disciplines and fields (Ricard, Zachariou & Burgos, 2020; Mjwara, 2017). The DoE in South Africa pledged 2003 to ensure that all learners had access to ICT resources and were technologically literate by 2013 (Munje & Jita, 2020:265). In the

21st century, ICTs offer learning opportunities but require supportive infrastructure and digital literacy. Rural South African teachers face challenges due to government resource constraints, although the government also partners with the private sector to provide support (Mwapwele, Marais, Dlamini & Van Biljon, 2019:1-2).

2.4.3 Summary: ICT implementation in schools abroad: Some international perspectives

The previous sections concentrated on a critical analysis of the historical evolution of ICT in both industrialised and developing nations. This included discussing the principal's role in implementing ICT and various scenarios. In comparing ICT implementation, the literature indicates that schools in developed countries are perhaps more advanced in teacher capacity in utilising ICT. ICT implementation was also addressed in these schools much earlier than in developing countries, with evidence of more extensive investment in solid infrastructure than in less privileged schooling environments. The literature has shown that noteworthy efforts have been made in developing countries regarding infrastructure.

The following section deals with the implementation of ICT policy. The principal's role will be discussed per the study's central argument.

2.5 POLICIES RELATED TO ICT IMPLEMENTATION IN SCHOOLS

Wang, Wei, Van Wart, McCarthy, Liu, Kim and Ready (2022) point out that ICT usage needs to be carefully managed through institutional policy and management-leadership processes. An effective ICT policy is crucial for integrating ICT into learning environments, revolutionising teaching processes, and opening new opportunities. A clear strategy is essential for effective integration and improved education quality (Agyei, 2021; Cheung, Kwok & Phusavatand Yang, 2021). For example, to support teachers in integrating ICT into their lessons, school principals should have a detailed plan for ICT integration. UNESCO (2022:88) and Signe (2017:15-16) suggest using national policies and regulations as guidelines for drafting an ICT policy for schools. The process involves exploration, adoption, strategy development, organisation establishment, funding, and staff hiring. The implementation phase is an

organisational change process, and the final stages involve innovation and sustainability to serve the targeted population better.

The following policies and regulations will assist the principal and their SMT draft the school's ICT policy. Therefore, principals must thoroughly understand the various available policies and guidelines. This view is supported by Lyonga (2022:39) and Van Deventer (2016:23), who state that influential educational leaders and managers must be policy dissemination experts.

2.5.1 White Paper on e-education

In schools, the e-Education policy is intended to transform learning and teaching (Mofokeng, 2019). In 2004, South Africa adopted the “White Paper on e-Education. Transforming Learning and Teaching through Information and Communication Technologies". This policy aims to implement and address ICT in South African education. South Africa, however, faces severe educational challenges, including an urban-rural digital divide. The White Paper summarises the implementation strategies used in South Africa and the unaddressed difficulties, like ICT infrastructure, teachers' attitudes toward ICT integration, ICT leadership, etc., faced by e-learning practitioners. Mooketsi and Chigona (2014:2-3) state that the policy describes how ICT will transform South African teaching and learning. Teachers and learners in South Africa, regardless of race, should be able to:

- to employ ICTs to retrieve, examine, combine, display, and transmit information;
- to design and adapt knowledge and information using ICTs;
- to develop communication and collaboration skills, whether using ICT or not, to embrace a knowledge society;
- to improve teaching and learning with ICTs and
- to locate and use ICT resources to aid in the delivery of curricula (DBE, 2004).

The South African government aimed to equip learners by 2013 with education communication technologies; however, a digital divide persists due to inadequate consideration of attitudes and intra-personal factors (Faloye & Ajayi, 2022; Laher & Boshoff, 2017:200). The Khanya project, initiated by the Western Cape Department of Education, aimed to provide ICTs to all public schools in the province by 2012, and

particularly to disadvantaged schools, to enhance curriculum delivery and teacher effectiveness, to support diverse learning styles, and to facilitate differently abled learning (Mdingi & Chigona, 2021; Mooketsi & Chigona, 2014:2-3). Gunzo (2020) and PanAf Research Agenda (2008-2011) confirm that the government's ICT policy is often poorly implemented by its intended beneficiaries (for instance, due to the digital divide in some cases). In this regard, Ndlovu and Lawrence (2012:1) allude to the critical fact that formerly disadvantaged schools are still unable to compete with well-financed schools when using new ICTs for teaching and learning.

Provinces were responsible for implementing e-education policies as outlined in the White Paper (Abbasi & Tripathy, 2023; Mooketsi & Chigona, 2016:3). The DBE's vision for a 21st-century principal emphasises the role of principals in integrating ICT, fostering collaboration, and interacting with teachers, parents, and communities (DBE, 2016). Vandeyar (2021:44) emphasises that successful implementation requires healthy cultures and forward-thinking leadership. The policy, initially symbolic, has not been integrated into curriculum changes or promoted systemically. One possible explanation for the lack of implementation or promotion of policy in schools could be principals' inadequate use of ICT (Timotheou et al., 2023:6712).

2.5.2 Implementation strategy for e-education in South Africa

South Africa's e-Education Strategy, based on the 2004 White Paper, aims to implement objectives, achieve 2014 goals, and support the National Strategy for Learner Attainment. Teaching and learning are enhanced by the implementation of ICT in education and training, which is driven by national goals for teacher preparation, the distribution of electronic multimedia content, content access, ICT facilities, and internet connectivity in schools (Munje & Jita, 2020:265).

According to Mofokeng (2019) there are four key strategies to improve the implementation of ICT in education: i) making use of ICT in the classroom as a tool to promote learning; ii) understanding the different technologies available; iii) collaborating with stakeholders to drive e-education; and iv) analysing e-education's status quo and envisioned results. According to Pathayachee (2017), research is required to ascertain the available technologies and whether they have been successfully incorporated. The implementation of ICT in South African education is a

long-term effort by various institutions, including NGOs, solution providers, and education departments. However, a clear, integrated strategic direction is lacking. However, it acknowledges school diversity and Operation Phakisa lacks context-sensitive objectives, an integrated strategy, and clear budget prioritisation (Gunzo, 2020).

DBE's 2013-2025 e-education strategy aims to achieve an ICT implementation connecting 16 102 schools nationwide with primary ICT resources, with provincial education departments playing specific roles (Munje & Jita, 2020:265). The school principal's responsibilities include defining the vision and strategic objectives, drafting a school development plan, managing ICT integration in learning and teaching, business activities and data, regulating access to resources, and teaching learners with special educational needs (Van Greunen et al., 2021:4).

2.5.3 Professional development framework for digital learning

Teachers need to create innovative pedagogical approaches and include ICT to enhance the teaching and learning process and promote learner involvement, as stated by the Professional Development Framework for Digital Learning (DBE, 2014). In the DBE Action Plan 2019, goal 16 is teacher capacity and professionalism. The Department of Basic Education is committed to enhancing both the professionalism and teaching skills of teachers throughout their careers (DBE Action Plan, 2019:34). To guarantee that leaders and support personnel assist teachers in developing their digital learning competencies and that teachers utilise ICTs to improve teaching and learning, ICT training for teachers should be prioritised (Mofokeng, 2019). To improve a learner's learning experience, teachers use digital tools and resources for digital learning. Teachers should have the ability to plan and facilitate digital learning as the basis for their needs analysis and professional development (DBE, 2018:11). According to Hamzah, Nasir and Wahab (2021:220), principals must bridge the digital learning gap by offering practical skills training to teachers, thereby boosting their confidence and motivation to continue practising digital teaching. Darling-Hammond, Wechsler, Levin, Leung-Gagné and Tozer (2022:23) opine further that to align professional development with teachers' needs, the principal should monitor and evaluate teacher planning. The purpose of this policy document is to examine further

how teachers utilise ICT to open more opportunities for learners through the teaching frame for digital learning. The DBE (2014) highlights the importance of school principal support for teachers, emphasising the potential of ICT integration in enhancing teaching and learning, learner engagement, and curriculum objectives. The focus is on learner-centred, transformative digital learning facilitated by structured schools that allow learners to fully utilise ICT and explore digital tools for learning (Mngadi, 2021:42). The principal's role is to promote the use of the framework, build capacity for professional development in digital learning, and encourage teachers to plan and record continuing professional development (DBE, 2018:32).

2.5.4 Cybercrimes and the Cybersecurity Act 19 of 2020

The Act related to cybercrimes and cybersecurity is primarily designed to combat cybercrime. There is no universally accepted definition of cybercrime. Cybercrime involves data, computer programs, data storage or systems that cause harm through technological means, practices and approaches (RSA, DoJCD, 2020). Sutherland (2017:83) claims that governments prioritise security more because of the growth in social media, internet access, and digital services. This has made the creation of regulatory frameworks and advisory bodies necessary, as well as the need for data protection and counsel. According to Ameer-Mia, Shacksnovis and Mthembu (2019:3), a task force has been established to align and review South Africa's cybersecurity laws as part of the National Cybersecurity Policy Framework (NCPF) (MNO Joint Submission on Cybercrimes and Cybersecurity Bill, 2017:3). The Cybercrimes Bill was adopted in 2017, and covered jurisdiction, courts, investigative powers, and reporting obligations. In 2020, countries like South Africa called for an Internet Code of Good Practice to combat cyberbullying (Marrone et al., 2021:8).

2.5.5 South Africa’s Broadband Policy

South Africa Connect aimed to promote the development of national broadband networks by 2013 to achieve universal internet access by 2030 (Mwapwele et al., 2019:1). Considering the importance of pro-active government involvement in reducing the digital divide, the National Planning Commission advises carefully crafted interventions. Poor intervention design has led to missed opportunities in the past

(NPC, 2012:190). The DBE Action Plan for 2019 emphasises the significance of adequate policy frameworks, with the Department of Communications' 2014 Green Paper on ICT being a significant advancement (DBE Action Plan, 2019:17). South Africa's Broadband Policy aims to facilitate broadband infrastructure rollout and content development, providing an open, fair, and competitive regulatory environment. It supports public and private investments for social and economic purposes (RSA, Department of Communication (DoC), 2013:2).

The policy recommends that teachers and principals enhance internet connectivity to access and utilise learning materials, thereby enhancing classroom learning and fostering digital skills (Mwapwele et al., 2019:3). It is suggested by Mwapwele et al. (2019:17) that the government should revise the Schools Act to limit SGBs' power to dictate ICT use in classrooms, expedite South Africa Connect, and restrict personal digital devices to educational purposes.

2.5.6 Summary: policies related to ICT implementation in schools

The preceding sections have mainly dealt with the policies concerning implementing ICT in schools and the principal's responsibility for enforcing them. This conversation makes it evident that the policies permit the implementation of ICT in the classroom. Whether the relevant policies consider the contextual challenges that confront schools, especially in quintile 1-3 schools, is debatable. The lack of attention paid to the crucial role principals should play in implementing ICT in schools is perhaps even more concerning. Another primary concern with these policies is the absence of guidelines for principals.

2.6 THE LEADERSHIP AND MANAGEMENT ROLE OF PRINCIPALS

This study is about the role of principals in the implementation of ICT. The primary role of principals can be divided into leadership and management. The following section deals with principals' leadership and management roles. These roles confer on principals the responsibility to implement ICT in schools.

2.6.1 Defining the leadership and management roles of the principal

Murugesan (2012:1) says that management can be defined in countless ways, including using people to accomplish tasks to achieve a common objective. Ramasamy (2014:2) adds the effective use of resources to this. At the same time, Klinck et al. (2023:3) and Van Deventer (2016:110) emphasise that school management is a comprehensive task that includes objectives, role players and academic projects. Management comprises planning, organising, leading, and controlling activities: planning involves problem-solving; organising involves creating structures; leading involves communication and motivation; and controlling involves corrective action, supervision and evaluation (Kaehler & Grundei, 2019:8). Ismail, Khatibi and Azam (2022:262) emphasise the importance of school planning, policy and procedure documents for operational efficiency, stating that these provide a framework for effective school management.

Education leadership is a comprehensive concept (Van Wyk, 2020), with particular values and principles that underpin it, according to the Standard of Principalship (DBE, 2016). Krauter (2022:148) defines leadership as the influence of a person on a group of individuals to gain a shared goal. Sifat (2019:5) and Gadirajurrett, Srinivasan, Stevens and Jeena (2018:4) define leadership as leading people towards achieving goals. This is done by influencing worker behaviours. Leaders (in schools as well) create a clear organisational vision, inspire workers, mentor them through tasks, and boost morale. Leadership involves inspiring and motivating people to meet common goals, which can be modified or added. With good leadership, people are connected beyond the surface level and motivate each other to succeed rather than being forced (Malik & Azmat, 2019:25). A leader is capable of influencing others through communication to accomplish meaningful, demanding goals (Ibrahim & Daniel, 2019:367; Delia, 2018:330). Musaigwa (2023) outlines four key strategies for leaders to drive future change: vision, strategy, alignment, and motivating and inspiring to establish direction, achieve goals, and create commitment.

The Standard of Principalship (DBE, 2016) lists eight critical areas of a principal's leadership and management responsibilities, which Van Deventer (2016:37) presents) as well. Seven of these eight responsibilities can be directly linked to ICT implementation. These include overseeing and directing the educational institution, determining the course and growth of the institution, managing and supervising quality,

and ensuring accountability. Additional management-leadership responsibilities include overseeing and managing the school's human resources and managing and leading the school as an organisation. They also include working with and for the local community and the larger school.

2.6.2 The significance of leadership and management in ICT implementation

Leadership in the 21st century means thriving under challenging circumstances; today's markets and people differ from 20 years ago. They have different goals and interests, live in various environments, and define themselves and work differently from the way that previous generations did (Klasmeier & Rowold, 2022:36-37). Leading is about creating a vision for what can be accomplished, communicating it to others, and developing strategies for achieving it. To achieve their goals, leaders motivate people and negotiate for resources and support. According to Haleem et al. (2022:277), effective ICT implementation requires a common vision, learner involvement, equitable access, professional development, and pervasive networks. Managers make sure that the available resources are well organised and applied. In many low- to middle-income countries, managers must also be leaders with limited resources (Akparep, Jengre & Mogre, 2019:2-3; Wajdi, 2017:75). In Samson, Donnet and Daft's (2020) view, management is necessary for an enterprise or institution to function correctly. The management can plan activities to meet objectives and cost-effectively utilise the resources. The Standard of Principalship stipulates that managing resources that support teaching and learning is a vital curriculum function related to ICT implementation (DBE, 2016). Leadership and management in schools are increasingly regarded as crucial if schools are to achieve the broad objectives set for them by many of their stakeholders, especially those governments that provide the most funding. Global growth requires an educated workforce to maintain and increase competition (Oraifan, 2021:115). Walsh and Gleeson (2023:9) concurs, stating that schools should prepare learners for a rapidly changing job market. A high academic standard must be 'deliverable' by teachers and their leaders and managers. The key to improving schools is raising leadership and management standards. As a result, it has become increasingly important to prepare and develop leaders to be ICT-responsive.

2.6.3 Distinctions between leadership and management and implications for ICT implementation

This section highlights some differences between the various concepts of leadership. Since the principal's role is to both lead and manage ICT implementation, this discussion aims to lay the basis for discussions about the leadership and management role of the principal in later sections (cf. 2.7 & 3.6) of the thesis. The specific responsibilities, actions and tasks related to these two concepts (leadership and management) will be aligned to highlight the principal's role in ICT implementation. There is a misperception that all managers are leaders, as some do not lead, and some people lead without being managers. The distinction between leaders and managers continues to be controversial (Pauliene, Diskiene & Matuzeviciute, 2019; Algahtani, 2014:71). Lunenburg and Ornstein (2021) and Wajdi (2017:75) emphasise that good leadership and management are crucial to quality services. They may be similar in some respects, while their outlook, skills, and behaviours may differ. To be effective as managers, they need to be good leaders. Vision is the key to leadership, and it means communicating that vision and devising strategies to reach it, motivating others, negotiating resources, and supporting them to achieve their goals. Pellegrini, Ciampi, Marzi and Orlando (2020) distinguish leadership from management, linking management to maintenance and leadership to change. Leadership involves shaping others' goals, motivations, and actions toward achieving desired goals. It requires creativity, energy, and skill to achieve existing and new objectives. The overall function of management is to maintain the current system rather than to change it (Memela & Ramrathan, 2022:2). Leadership and management differ, depending on the circumstances. Combined, "leading" and "managing" describe the skills and abilities necessary for team success. Concepts of management and leadership work well together, particularly when it comes to an organisation's ability to function effectively (Musaigwa, 2023:3; Azad, Anderson, Brooks, Garza, O'Neil, Stutz & Sobotka, 2017:1). Leadership styles are influenced by personalities and situations and are shaped by the leader and followers, making it an interaction rather than a static process (Akparep et al., 2019:3; Delia, 2018:331).

Two key policy documents guide principals regarding their management roles and responsibilities. These documents do not stipulate how they should give direction regarding ICT implementation but provide guidelines on how leadership and

management principles and actions could be applied. The researcher selected duties that can be aligned only with the implementation of ICT.

2.6.4 Critical South African education leadership and management policy documents

2.6.4.1 PAM document

The Personnel Administration Measures (PAM) are regulations issued by the Minister of Education under the Employment of Teachers Act 1998 (the Act) and the Regulations made under the Act (Regulations) to determine and consolidate teacher employment terms and conditions (DBE, 2022). The main functions are indicated in Figure 2.3 below:

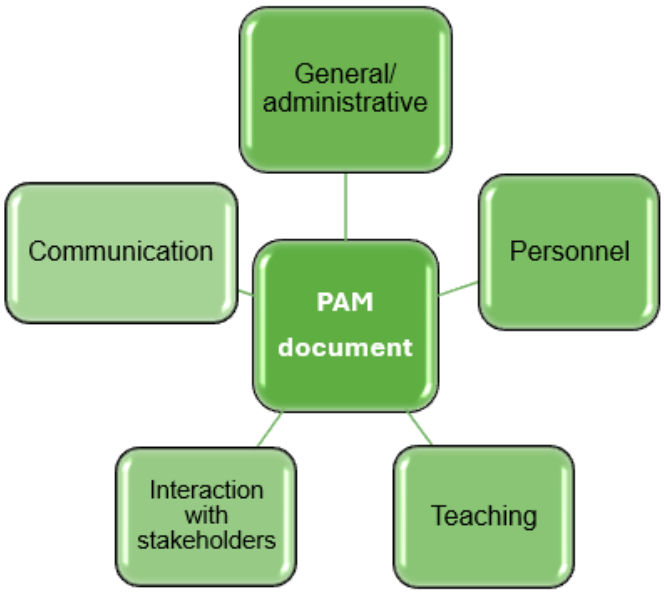

Figure 2.3: Functions of PAM, (DBE, 2022)

The PAM document outlines the principal's **administrative** role, including professional management, school premises and equipment inspections, staff activities, departmental circulars, and learner correspondence (DBE, 2022). Tsoli, Babalis, Alexopoulos and Tselepidi (2021:10) state that as part of this administrative role, the principal is responsible for (a) supervising teaching and learning and ensuring the smooth operation of the curriculum and (b) maximising school resources through planning, organising, directing/leading, and controlling.

Principals have a professional leadership role in personnel; this includes directing, overseeing, and advising all staff members (DBE, 2022). Fatih (2020:61) claims that the principals of schools provide opportunities for teachers' professional development, even though teachers are also responsible for their professional development. This is a significant factor in the improvement of ICT. They should also make sure that employees' workloads are divided fairly. Moreover, they oversee the creation of staff training initiatives (DBE, 2022). Agreeing with the issue of guidance and professional advice in ICT, Kwatubana (2019:188) avers that a school principal can support and motivate teachers by implementing an ICT curriculum, improving learner learning, and developing their digital competencies. Additionally, they begin introducing innovative teaching methods.

Teaching is sometimes required from principals. However, Bhengu (2021:12) argues that a principal's job is instructional leadership, ensuring a clear goal focusing on learners' learning and that the teaching staff believes in the school's goals. ICT is a powerful tool that can transform how teachers and learners work together. Principals should encourage teachers to integrate ICT into the classroom so that learners can create and share what they have learned (Lomos, Luyten & Tieck, 2023).

Interaction with stakeholders is another vital responsibility indicated in the PAM document. According to the PAM document, the principal’s duties also relate to interaction with stakeholders, such as serving on the school's governing body. Maruping and Velempini (2022:202) argue that organisations such as Vodacom-SA, Telkom, and SchoolNet develop and equip teachers to use ICT in education. There are digital classrooms or ICT centres where teachers and learners can access computers and the internet. In addition, Vodacom donates laptops, projectors, modems, and interactive whiteboards to schools, allowing schools to benefit from initiatives from external stakeholders. The principal, therefore, needs to pursue interaction with such stakeholders.

Communication is another critical leadership role that is highlighted in the PAM. For the school to operate smoothly, principals and staff members must collaborate. Continuous staff communication is crucial for ICT implementation, just as visual communication is crucial (Rasoo & Naidoo, 2024:3). Principals should collaborate with various government departments and educational institutions to ensure effective

curriculum development, learner records and performance, and should participate in committees, seminars and courses (DBE, 2022).

2.6.4.2 The Standard for Principalship

As mentioned above, the principal's management and leadership abilities are critically important to the education system. According to Nasreen (2019), principals' leadership is one of the top priorities for school reforms. The South African Minister of Basic Education, Angie Motshekga, has published the South African Standard for Principalship policy to improve principals' professional image and competencies. The policy focuses on five-dimensional tasks, including shaping the vision, direction, development, and creating conditions for future learners. It aligns these tasks with ICT implementation, focusing on professional development opportunities, encouraging ICT use, and managing school conditions for successful implementation. This policy is significant for schools facing contextual challenges (DBE, 2016). Figure 2.4 illustrates the role of the principals according to the Standard for Principalship.

Figure 2.4: Role of principals according to the Standard for Principalship (DBE, 2016:10)

2.7 CONCEPTUAL FRAMEWORK: MANAGEMENT ROLE OF THE PRINCIPAL IN ICT IMPLEMENTATION

The previous sections highlighted the principals' role in leadership and management. This section will discuss the conceptual framework adopted for this study, focusing on the concepts and ideas related to management. The researcher first defines the term conceptual framework, followed by a schematic representation of what a conceptual framework entails. After this, a narrative description of the study's conceptual framework will follow. Large parts of the framework are derived from two key policy documents that guide the leadership and management roles of the South African school principal. These are the Standard for Principalship (DBE, 2016) and the PAM

document (DBE, 2020). Although these documents form the backbone of the conceptual framework, the framework is also supported by relevant literature related to the management roles of principals. The focus was obviously on ICT implementation; therefore, concepts, theories, and related ideas were also consulted.

2.7.1 Definition of a conceptual framework

The conceptual framework organises one's entire research project. Throughout the research process, the conceptual framework embodies metacognition, reflection and operational elements (Kivunja, 2018:47). Gornik-Tomaszewski and Choi (2018:48) argue that ad hoc guidance without a framework can lead to inconsistent and incoherent guidance, causing negative consequences. A conceptual framework is utilised in research projects to articulate concepts, but there are no general rules due to its contextual nature and imprecise language (Ukwoma & Ngulube, 2020). Shikalepo (2020:2) highlights that conceptual frameworks aid in understanding a phenomenon by combining related concepts and literature findings to outline a research agenda. Adom and Hussein (2018:439) explain that diagrams define research constructs and their relationships in a conceptual framework. Then, researchers must explain their relationships and complementarity to answer the research problem. Based on this advice, the researcher provides first a schematic representation of the conceptual framework (cf. 2.7), followed by a narrative discussion (cf. 2.7.4).

2.7.2 Schematic representation of the conceptual framework

The schematic framework below outlines principals' leadership and management roles in a comparative study of implementing ICT in schools. It also highlights the challenges specific to implementing ICT in schools categorised as quintile 1-3 compared to those in quintile 4-5.

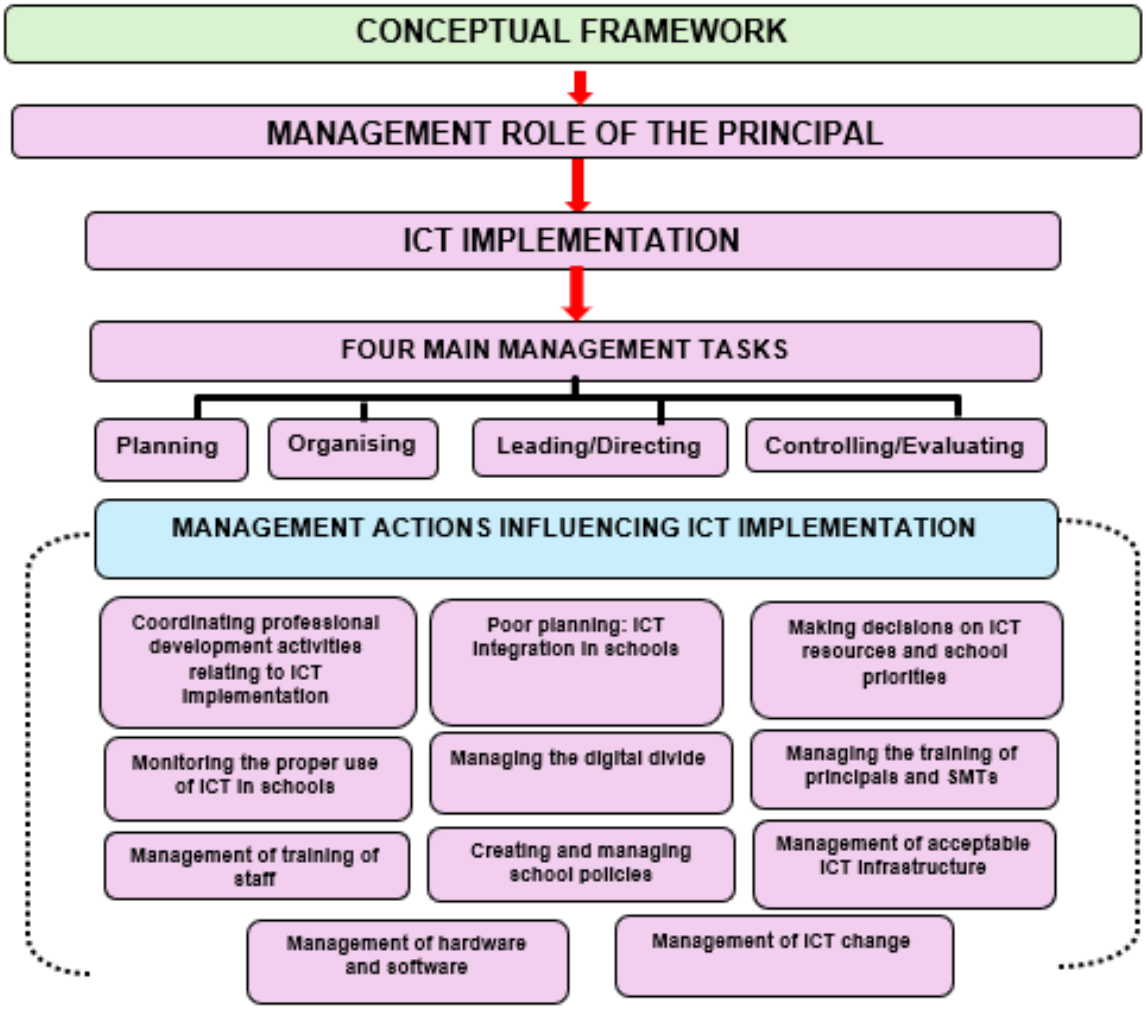

Figure 2.5: Schematic representation of the conceptual framework

2.7.3 Narrative discussion of the conceptual framework employed

Adom and Hussein (2018:439) emphasise the importance of a conceptual framework in promoting and systemising knowledge based on empirical research and critical theories. From this school of thought, concepts, empirical research, and theoretical perspectives were selected to describe the relationships between these main concepts of the study. These include “principals’ roles”, “implementation of ICT”, and “communication technologies”. These relevant conceptual perspectives aimed to provide insight into the management roles of principals in ICT implementation.

The role of principals in implementing ICT in schools is a critical aspect of educational transformation. Principals are expected to manage day-to-day operations efficiently to ensure smooth school functioning (Darling-Hammond, et al., 2022) (cf. 2.6.3).

Effective management is important for successful ICT implementation in schools because it helps to create a supportive environment that encourages innovation while addressing potential challenges (Kwatubana, 2023:186). The critical South African policy documents speak to the principal's role in implementing ICT in schools. The PAM document provides guidelines on various aspects of the school, including general administrative tasks, teaching, interaction, and communication (cf. 2.6.5.1). Since context plays an integral part in this comparative study, the educational settings in the different quintile schools are also compared. This helped the researcher to situate the study within quintiles 1-3 (which are very much resource-constrained – cf. 2.4.1) and quintiles 4-5 contexts and to understand the contextual factors that influence ICT implementation. The principal's role in implementing ICT can be contextualised based on this understanding.

2.8 FORMAL MANAGEMENT THEORY

According to Bush (2020) and Botha (2013), management is often considered a practical activity, with no single all-embracing theory of education management. Prominent academics in education management, like Bush (2013:16), list several models for managing education, such as formal, collegial, political, subjective, ambiguous, and cultural (Qutub, 2021). These models date back to 1999 when Bush (2020) identified six models from scrutinising 121 articles. According to De Souza Rodrigues, Chimenti and Nogueira (2021), a school cannot be managed according to only one model. This study, however, adopts the formal management model emphasising functions within the system. Simons (2019) and Botha (2013:13) maintain that management is carried out rationally, emphasising the significance of management tasks and that specific goals are pursued. According to Gutterman (2023), the four primary management tasks can be divided into subtasks.

2.8.1 Planning

This management function comprises problem-solving, decision-making, policymaking, and establishing a vision, mission, goals, and outcomes (Sinnaiah, Adam & Mahadi, 2023:38). Mestry and Ngcobo (2018:104) point out that problem-solving entails having the ability to develop a well-thought-out solution within a

reasonable timeframe. Principals must make crucial decisions and solve problems that are besetting the organisation (Mestry & Ngcobo, 2018:103). Policymaking at the school should be guided by the Standard for Principalship, which states that management, policies and practices should consider local conditions, adhere to provincial and federal laws, and represent the objectives and needs of the institution (DBE, 2016:15). Ryan and Deci (2020) state that this process should create systems for operational efficiency and that the management team should draw up planning, procedure and policy documents.

2.8.2 Organising

This aspect involves implementing the plan. The sub-tasks are establishing an organisational structure, delegating, and coordinating (Sinnaiah et al., 2023:38). Muma (2020) and Botha (2013:21) state that this process is characterised by the decentralisation of power from the top to the bottom and that the principal needs to be careful not to delegate tasks of which they are not knowledgeable. According to Mestry and Ngcobo (2018:103), coordination is when all relevant activities are synchronised.

2.8.3 Leading/Directing

This facet of management involves the capacity to motivate people to carry out plans and to lead the subtasks of negotiation, conflict resolution, and communication (Buchholz & Knorre, 2023). It also involves inspiring others to do the same. For Ryan and Deci (2020) and Botha (2013:22), this function entails that the principal directs the organisation towards achieving organisational goals. This includes having both intrinsic and extrinsic motivational strategies to motivate staff members.

2.8.4 Controlling/ Evaluating

This management function is the task of continuously evaluating and adjusting plans. According to Kisovu (2019), several sub-tasks involve evaluating actual performance, assessing deviations, supervising, establishing standards based on planned objectives, and implementing corrective measures, such as disciplinary actions. Piirto (2019) asserts that to guarantee that tasks are finished on schedule and to a

satisfactory standard, it is critical to establish a system for tracking performance and progress. This strategy has two benefits: it warns of possible issues and guarantees that the work will be completed on schedule and by acceptable standards (Piirto, 2019). Botha (2019:189) points out that education management comprises typical management areas.

2.8.5 Application of the formal management theory to ICT implementation

School principals should integrate digital technologies into curricula and plan development initiatives from an ICT perspective, involving stakeholders in a strategic plan that addresses learning objectives and secures technology resources. Planning consists of organising and obtaining technology resources for teachers, which is crucial for the instructional improvement of the ICT curriculum (Kwatubana, 2023:188). Munifah and Purwaningrum (2022:71) state that school principals should encourage teachers to adopt innovative teaching methods, such as media-based teaching, which requires more specialised planning. To keep schools credible, principals must lead learning innovation technology disruptions quickly and strategically, although cautiously. They must also ensure that communication is sympathetic and credible (Wiyono, Komariah, Alghamdi, Sultoni & Fahlevi, 2023:2). It is the goal of a principal's organisational skills to increase teachers' trust in the integration of ICT, with a particular emphasis on providing sufficient infrastructure and technical support to facilitate curriculum implementation (Ismail, Omar & Raman, 2021:879). It is, furthermore, the responsibility of the principal to oversee the implementation of ICT-based management policies concerning the use of ICTs by educators, learners, and leaders (Kwatubana, 2023:188; Setiawan, Satori & Munir, 2018:404). According to Akinwumi, Faremi and Olatunbosun (2020:3), for adequate supervision, evaluation or support, a classroom teacher requires an administrator to be knowledgeable about ICT and aware of what to look for in the classroom. Van Greunen et al. (2021:3) explain that the principal must keep an eye on the adoption of ICT and utilise the findings of evaluations to plan the programme, identifying opportunities, challenges, and particular needs such as technical support and professional development. It takes ongoing evaluation to proceed without wasting time, energy, or resources. According to Hero (2020:4), principals should evaluate employees' technological proficiency and make appropriate plans for their professional development based on their findings.

2.9 MANAGEMENT ACTIONS INFLUENCING ICT IMPLEMENTATION

Henri Fayol, the father of modern management theory, outlined the three pillars of school management: administration, finance, and human resources. This includes planning, organising, directing, coordinating, and controlling to improve schools through smooth operations (Gunasekara, 2023). Principals' duties include managerial responsibilities. Creating a successful learning environment requires hard work and effective management (Chabalala & Naidoo, 2021:3).

2.9.1 Coordinating professional development activities relating to ICT implementation

Providing teachers with access to technology to implement digital learning platforms is not enough. Teachers need 21st-century skills and pedagogical approaches that leverage digital tools (Dlamini & La Fleur, 2022:32). Digital tools are transforming schools, requiring educators, policymakers, and principals to recognise their potential for practical use and to use them as means rather than ends (Wohlfart & Wagner, 2023:349). The application of ICT strategies in the classroom is more challenging than learning them during ICT training (Dlamini & Mbatha, 2018:18), and organisation, duration, pacing, material selection, learning site, and participant selection criteria differ from school to school (Mnisi, Mtshali & Moses, 2024:129). Quite often, there are unrealistic expectations and rhetoric about ICT enhancing learning. The lack of ICT professional development leads to ineffective ICT integration. Professional development is related to the programme content in many ways. It can improve teaching and learning if teachers perceive technology integration as part of their professional evolution (Das, 2019:97; Dlamini & Mbatha, 2018:18).

Since most professional development programmes place more emphasis on skill acquisition than on facilitating change processes, the calibre of teachers' professional development programmes has a significant impact on their readiness to accept and incorporate ICTs into the classroom (Dele-Ajayi et al., 2021:3). One factor contributing to the sluggish adoption of ICT in the classroom is insufficient training for teachers in ICT. Although teachers in well-resourced schools (quintile 5) generally have access to meaningful ICT professional development activities, schools in poor socio-economic contexts adopt ICT at the lowest rates (Mwapwele et al., 2019:5; Dlamini & Mbatha,

2018:28). All teachers, however, need continuous training in ICT, and schools should use what they have with specific goals in place, especially about the training of teachers in computer usage. In addition, schools may hire professionals to continue to upskill their teachers. Every teacher must feel at ease utilising computers without worrying about breaking anything or losing important data. After obtaining comfortability, schools can decide how to upskill their teachers further.

For the principal to fulfil his or her obligations as a leader, manager, and supervisor, they must coach following the objective of instruction, guide inexperienced teachers using technology, and coordinate various ICT-related activities, including teaching and learning, within his or her authority and responsibility (Shava et al., 2021:119; Setiawan et al., 2018:406).

2.9.2 Poor planning: ICT integration in schools

The lack of clear educational policies and plans can impede ICT integration in public schools. Teachers may struggle to integrate ICT in their classrooms despite adequate ICT planning and strategies. ICT must be used in education in line with strategic policy and planning (Munje & Jita, 2020:267; Salam, Zeng, Pathan, Latif & Shaheen, 2018:255). According to Nhlapo (2020), school personnel may misuse physical and material resources in the school intentionally, ignorantly, or unknowingly. There is also the possibility of neglecting or overusing school facilities due to poor planning. Because the use of ICT in education requires planning and a strategic policy (UNESCO, 2022:44; Salam et al., 2018:255), inadequate ICT planning and strategies may make it more difficult for teachers to incorporate ICT into their lesson plans. To integrate ICT and enhance learners' learning, technology planning should include more than just purchasing hardware and software, installing laboratories, and wiring buildings (Chander & Arora, 2021:4; Razzak, 2013:3). The technology leader should outline the steps needed to achieve the ICT vision, including the goals, roles, and resources, with the principal responsible for procurement, maintenance, and fostering a supportive environment (Okeke, 2019:53).

2.9.3 Making decisions on ICT resources and school priorities

Decision-making involves selecting logical options from various choices, considering both good and bad aspects. It involves prioritising choices to achieve a successful outcome, requiring individuals to carefully consider all factors (Savioni, Triberti, Durosini & Pravettoni, 2023). Lack of computer knowledge and experience in teachers hurts academic performance and hinders teaching and learning. It is often caused by inadequate computer training, financial constraints, and lack of dedicated space for computer training in schools (Savioni et al., 2023; Munje & Jita, 2020:266). Those without access to new technologies face a digital divide, according to the White Paper on e-Education, and ICT access reduces the risk of establishing such a digital divide (DBE, 2012:44). E-Learning enhances teaching and learning, improves education management, and streamlines routine tasks. Schools can control DBE decisions, make purchases, and assess ICT importance in annual budgets, enhancing teaching and learning (Khan, 2023:102).

2.9.4 Monitoring the proper use of ICT in schools

Schools integrate ICT, monitoring progress and using evaluation results to plan programmes. Periodic evaluation is crucial for rapid improvement. There are no standardised approaches, so assessment tools vary depending on ICT and education (Van Greunen et al., 2021:3). School principals play a crucial role in monitoring to ensure effective teaching and learning. With a clear vision, the principal guides the school's activities. In addition, effective school principals are responsible for paying more attention to staff based on what is imperative rather than allowing them to get distracted by initiatives that will not benefit their learners. Akporehe and Asiyai (2021) suggest that principals should understand classroom dynamics, identify strengths and weaknesses, and tailor their staff development programmes to meet the school's needs. A technology leader evaluates schools' ICT programmes to ensure they align with their ICT goals. Using ICT in the classroom has been shown to improve pupils' academic performance. The principal evaluates these outcomes. Expected outcomes are measured through this evaluation process. Principals are accountable to stakeholders for supporting ICT in schools based on evaluating ICT outcomes. ICT

specialists are usually invited to evaluate ICT hardware and software during ICT staff development sessions (Okeke, 2019:54).

2.9.5 Managing the digital divide

As defined by Mphahlele, Mokwena and Ilorah (2021) and Mkhize (2017:9), the digital divide is the gap between those who have and those who do not have access to ICT services. This is an important aspect that needs to be managed by the principal. In Tang's (2021) view, teachers can establish discussion forums to discuss ICT use in classrooms and can learn from one another. Additionally, as part of the management role that principals need to perform, an expert in digital literacy may be appointed in schools to provide teachers with regular guidance on becoming ICT-savvy. Besides physical access, the digital divide is influenced by motivation, digital literacy, culture, and attitudes. Soomro, Kale, Curtis, Akcaoglu and Bernstein (2020:4) propose a four-level ICTV access model to understand the digital divide better. Users must first be motivated to use technologies. Principals need to plan and organise this process as part of management. Second, the user needs physical access to technology. This also has implications regarding planning and organising (as management principles). The third level relates to technology proficiency. Finally, usage access refers to the number, diversity, and frequency of applications (Soomro et al., 2020:4; Kale, Akcaoglu, Cullen & Goh, 2018:70).

2.9.6 Managing the training of principals and SMTs

Uğur and Koç (2019:47) explain that it is possible that principals are not fully aware of what their roles should be or the expectations surrounding technology integration in their schools. School principal training programmes do not typically include skills in technology management. School principals should refocus their professional development programmes because administrative courses do not effectively teach them how to use technology (Uğur & Koç, 2019:47). Leaders must develop innovative skills. Leaders can attend conferences, workshops, or online courses to enhance their leadership skills. This process should be organised and evaluated. Leaders can better integrate professional development activities into their leadership and learning practices by having access to a broader range of colleagues (Okeke, 2019:51;

Christensen, Eichhorn, Prestridge, Petko, Sligte, Baker, Alayyar & Knezek, 2018:10). Joynes et al. (2019:61) believe that education leaders must be able to support their teachers. Teachers and education leaders must be receptive to new roles and practices in ICT-enhanced learning environments. When principals are not computer literate, ICT integration is unlikely to succeed (Joynes et al., 2019:61). When principals lack ICT skills and knowledge, they may be influenced by uncertainty, and competence is vital for principals' use of ICT (Kwatubana, 2023:188; Omwenga, Nyabero & Okioma, 2015:143). A principal who lacks the necessary skills and knowledge will struggle to manage the process efficiently. ICT integration is one of the tasks that principals work on, partly because they are inadequately trained. Therefore, the leadership and managerial abilities principals need to perform their jobs are inadequate. Mngadi (2021:32) asserts that school principals should possess well-defined objectives and well-thought-out plans for integrating ICT.

2.9.7 Management of training of staff

A lack of technology training limits teachers' skills (Winter et al., 2021:235). Omito, Kembo, Ayere and Ali (2019:304-5) believe that teachers will need adequate ICT training to cope with the growing trends in education. Policies should support the development of ICT skills and competencies among teachers. For teaching, teachers need basic technology skills and knowledge about hardware and software, which can lead to problems in utilising the technology effectively in the classroom (Dogan, Dogan & Celik, 2020:1316). To understand technology integration, Johnson et al. (2016:8) recommend that school principals seek assistance to identify needs and provide ongoing training. This should be managed by planning the ICT training, organising the training process, and evaluating the success of the process.

In some schools, master teachers who successfully implement educational technologies lead professional learning communities. Organising can take place through outreach to education software companies. Education software companies and educational technology researchers should train schools and teachers. Online training, professional development courses, and continuing support are offered by many software companies to teachers for free (Coman, Tîru, Mesesan-Schmitz, Stanciu & Bularca, 2020:3). Kwatubana (2023:187) and Alkahtani (2017:34) suggest

that teachers should have access to computers for learning, professional and personal purposes, with principals controlling access and promoting informal teacher help.

ICT implementation is very successful when teachers are trained in computer skills and competencies and have positive attitudes and beliefs. ICT should be considered an integral part of the school curriculum and taught by teachers in all faculties (Singhavi & Basargeka, 2019:75). Darling-Hammond, Flook, Cook-Harvey, Barron and Osher (2020:100) emphasise the importance of teachers receiving training in multiple subjects to effectively integrate computers and modern pedagogical methods, with the principal's responsibility to evaluate the integration. Singhavi and Basargekar (2019:65) conclude that ICT could potentially empower teachers if fully integrated into existing educational processes. Principals should lead and manage the ICT integration process and make sure that ICT is fully integrated into the classroom. In the classroom, Mapisa and Makena (2024:217) and Ra, Chin and Lim (2016:78) assert teachers are the key innovators in ICT-enhanced learning environments, guiding learners and ensuring their capacity, while the principal controls and evaluates these tools. Teachers' professional development approaches often provide a one-size-fits-all approach to technology integration, hindering the development of digital skills in various educational environments (La Fleur & Dlamini, 2022).

2.9.8 Creating and managing school policies

ICT in education is being promoted by governments worldwide through policies that support investments in ICT infrastructure and high-quality education (Singhavi & Basargeka, 2019:72). In the implementation, strategies are used to put policies into practice. At the school level, ICT implementation involves leveraging both the principal's e-leadership vision and the government's ICT policy (Wu et al., 2019:1213). Integrating ICT into the curriculum requires a quality ICT policy. Research shows that school leadership, development, and implementation of policies impact learner performance (Makgati & Awolusi, 2019:48). South Africa's education system has made school managers a central part of the teaching-learning process. For any policy to be effective, school managers must be prepared to perform two primary roles: a school manager and an effective teacher. The school manager/teacher must set goals, manage curriculum activities, supervise, evaluate, and assess to create a sound

school climate (Shava et al., 2021:119). According to Haleem et al. (2022:276), many schools acknowledge that ICT has the power to revolutionise every facet of education and enhance every learning objective. Therefore, they adopted an ICT action plan. This action plan implements the National ICT policy (White Paper on E-Education, 2004). Schools have achieved these goals by providing ICT infrastructure and supporting teachers' professional development.

According to Vandeyar (2021:45), policies in South Africa frequently fail to recognise the valuable contributions that teachers make to classroom knowledge and experience, which restricts their ability to participate in the implementation of policies. Teachers' local contextual knowledge can enhance the implementation of policies; however, because of a misalignment between the mandates of policymakers and their pedagogical views, they are frequently disregarded as central actors (Vandeyar, 2021:45). The principal should oversee ICT policy drafting involving stakeholders and evaluating the process. They should develop teachers' professional skills for ICT integration, change beliefs, and clarify practical implementation steps (Lomos et al., 2023:5). Policies must be drafted to facilitate ICT integration so that schools can reap the benefits of such integration (Maruping & Velempini, 2022:202). For an ICT policy to be implemented successfully, schools must have supportive cultures, leaders familiar with its mandates, and professional teachers. Teacher involvement in school policy implementation at the local, provincial, district and national levels must be recognised (Vandeyar, 2021:44-45). According to Simelane (2020:8), all schools should have ICT policies. This is why principals and teachers should collaborate with all stakeholders to develop them: i) to sustain ICT implementation in the school curriculum; ii) to address the role of the principal; iv) to create conditions that support ICT; v) to provide trained staff and ICT coordinators; vi) to allow access to ICT facilities; vii) to evaluate ICT implementation practices; and viii) to cooperate among schools about ICT education, as a critical aspect of school policy development for the successful implementation of ICT (Simelane, 2020:8). It is the responsibility of the principal to lead and manage the drafting of the school’s ICT policies, and they must evaluate the process for successful implementation.

2.9.9 Management of acceptable ICT infrastructure (stable and affordable internet connectivity)

Creating a positive learning climate and a sound ICT infrastructure will help school leaders enhance teachers' ability to integrate digital learning materials (Bariu, 2020:2; Vermeulen, Kreijns, Van Buuren & Van Acker, 2017:2). In their argument, Aikins and Arthur-Nyarko (2019:487) assert that teachers accept technology for its benefits to teaching and learning, and not merely for its own sake. Providing teachers with an appropriate infrastructure or system is imperative to ensure that teachers can use technology without difficulty. The principal must organise and oversee a suitable ICT infrastructure at the school. Principals must control the use of these facilities so that teachers and learners can all benefit from them. Technology can help if it meets the content and characteristics of subjects and learners.

2.9.10 Management of hardware and software

As stated by Haleem et al. (2022:275) and Johnson et al. (2016:2), computers (laptops, tablets) and software (such as reading and writing applications and internet browsers), as well as an internet connection, are necessary. While ICT hardware and software are generally not designed for educational use, Alkahtani (2017:33) suggests using dedicated software. After learners have learned the basics of computers, they are taught computer applications. Principals must manage, control and evaluate the purchase of ICT hardware and software because it can be costly. The use of computers, printers, multimedia projectors, scanners, and other accessories is required by school IT policies, but not all educational institutions have access to these tools. It is also necessary to have a high-speed internet connection (Francis, Ngugi & Kinzi, 2017:75). Open-source software offers schools and other learning institutions cost-effectiveness, flexibility, and equity solutions compared to proprietary software, allowing access, distribution, modification, and use (Mwendwa, 2017:422-423). According to Bariu (2022:3), ICT requires modern hardware and software, so technology diffusion mainly depends on this. High-speed internet access is another requirement for integrating ICT into teaching-learning. Most developing countries do not have internet access.

2.9.11 Management of ICT change

ICT can be implemented in the classroom only if teacher-centric pedagogies are changed. Teachers must lead technology-enabled classrooms. A teacher's responsibility is to find solutions and to experiment. This can only happen if teachers' mindsets change; they must participate actively (Singhavi & Basargekar, 2019:63). School principals are responsible for setting the school's vision, but now they must also integrate digital learning tools and ensure that instructional goals are met. Principals should provide ongoing support for school technology integration to achieve positive outcomes (Uğur & Koç, 2019:46; Christensen et al., 2018:7). In addition to not liking the change, some stakeholders show resistance to ICT initiatives. Traditional teaching styles may be complex and challenging for teachers to change. Principals must evaluate how ICT integration affects teachers and learners and should provide guidance and assistance to facilitate this (Govindasamy & Mestry, 2022:2; Karunaratne, Peiris & Hansson, 2018). Besides legitimising educational changes, school leaders provide psychological assistance to teachers (Govindasamy & Mestry, 2022:3; Fullan, 2016). Yamamoto and Yamaguchi (2019:4) note that school leaders must influence teachers' motivation, commitment, beliefs, perceptions, and ability to cope with challenges when implementing ICT in schools (Cohen, 2019:556).

2.10 SUMMARY OF THE CHAPTER

This chapter has focused on a literature review relevant to the study's research aim. It covers the issue of ICT implementation in 21st-century schools, focusing on needs and advantages. The literature review has focused on the benefits of ICT-related instruction in classrooms and has included some international perspectives on ICT implementation in developed and developing countries. This discussion aimed to investigate what has been done in other countries, especially in terms of how the role of the principal is being exercised. This was followed by the noting of relevant policies that drive ICT implementation. Chapter 2 also outlines the conceptual framework adopted for the study and principals' leadership and management roles. In Chapter 3, the focus will be on challenges in resource constraint contexts, leadership and management barriers that influence ICT implementation, and approaches that

principals need to lead and manage ICT. Throughout the discussions, the researcher will compare implementation in different contexts.

CHAPTER 3
THEORETICAL FRAMEWORK AND LITERATURE REVIEW: PART 2

3.1 INTRODUCTION

Chapter 2 focused on a discussion about ICT implementation in schools in developing and developed countries, highlighting the role of the principal. This provided an excellent background to understand the situation in South African schools, where there are considerable disparities in resources, infrastructure, and other contextual challenges. Chapter 2 also focused on policies applying to ICT implementation in South African schools. Furthermore, the discussion revolved around the nature of the principal's leadership and management role, which form the critical construct of this study. A narrative and schematic explanation of the study's conceptual framework came next.

This chapter aims to perform a thorough literature analysis to identify the main points of contention and issues in discussions about the principal's role in overseeing and managing the integration of ICT in classrooms to respond to the study's aims (cf. sections 1.3 and 1.4). The chapter aims to acquire an understanding of the critical topics related to the contextual factors that influence the integration of ICT, i.e., resource constraint contexts (cf. 3.3), teacher barriers (cf. 3.4), and leadership barriers (3.5) in implementing ICT in schools. Resource constraint contexts are predominantly found in quintiles 1, 2 and 3 schools, while schools in more affluent areas (quintiles 4 and 5) experience fewer challenges. First, a discussion on the theoretical framework adopted for the study is presented, as mentioned in Chapter 1.

3.2 THEORETICAL FRAMEWORK

The following paragraphs deal with the definition and characteristics of a theoretical framework. This is followed by a discussion on the justification for selecting a theoretical framework for this study and relevant educational leadership theories, styles, and models relevant to ICT implementation in schools.

3.2.1 Definition and characteristics of a theoretical framework

The theoretical framework serves as the dissertation inquiry's guide, directing methodological, philosophical, epistemological, and analytical approaches. In addition to outlining the selected theory, definitions, and concepts pertinent to the topic, it offers a research framework based on a formal theory (Luft et al., 2022). Salawu et al. (2023:2104) and Adom et al. (2018:438) define a theoretical framework as a researcher's construction blueprint based on accepted theories pertinent to the researcher's hypothesis. It guides the researcher to ensure their final contribution is scholarly, adhering to established theories and avoiding straying from them. Passey (2020:98) explains that a theoretical framework is an organised set of theories and concepts derived from earlier studies and published information that serves as a theoretical basis for the analysis and interpretation of data. Hiebert, Cai, Hwang, Morris and Hohensee (2023:51) aver that a theory's tenets, constructs, and theoretical principles make up the theoretical framework. A theoretical framework creates links between facts and observations, forecasts and regulates circumstances, and encourages research by giving it focus and direction. These things help make research findings more generalisable (Omodan, 2022:276). A theoretical framework is crucial for research, providing a scholarly foundation for understanding data meaning. It helps identify patterns, connect abstract and concrete elements, and raises questions about existing theories. It also aids in discussing findings considering existing theories (Varpio, Paradis, Uijtdehaage & Young, 2020:291). A research study's theoretical framework is essential because it ensures focus and vision by giving all components – the problem statement, methodology, literature review, presentation, data analysis, and conclusion drawing – structure, support, and direction (Salawu et al., 2023:2104; Adom et al., 2018:438).

3.2.2 Schematic representation of the theoretical framework

The schematic framework below outlines the theoretical framework adopted for the study. This study used a two-pronged approach, focusing on instructional and transformative leadership theories. The theoretical framework, which provides structure and a set of concepts related to the principal's management role in ICT implementation, helped the researcher provide a theoretical basis for the research.

Furthermore, the conceptual and theoretical frameworks helped guide the data collection and analysis and the interpretation of the research findings. This study focuses on two theoretical perspectives that the researcher deemed relevant to the study. According to Hiebert et al. (2023:51), the theoretical framework directs investigation and helps one decide what to consider and measure. In this study, the researcher considered the principal's function in ICT implementation in the school. As a result, it was decided that instructional and transformational leadership theories would help direct the literature review, data collection techniques, and data analysis.

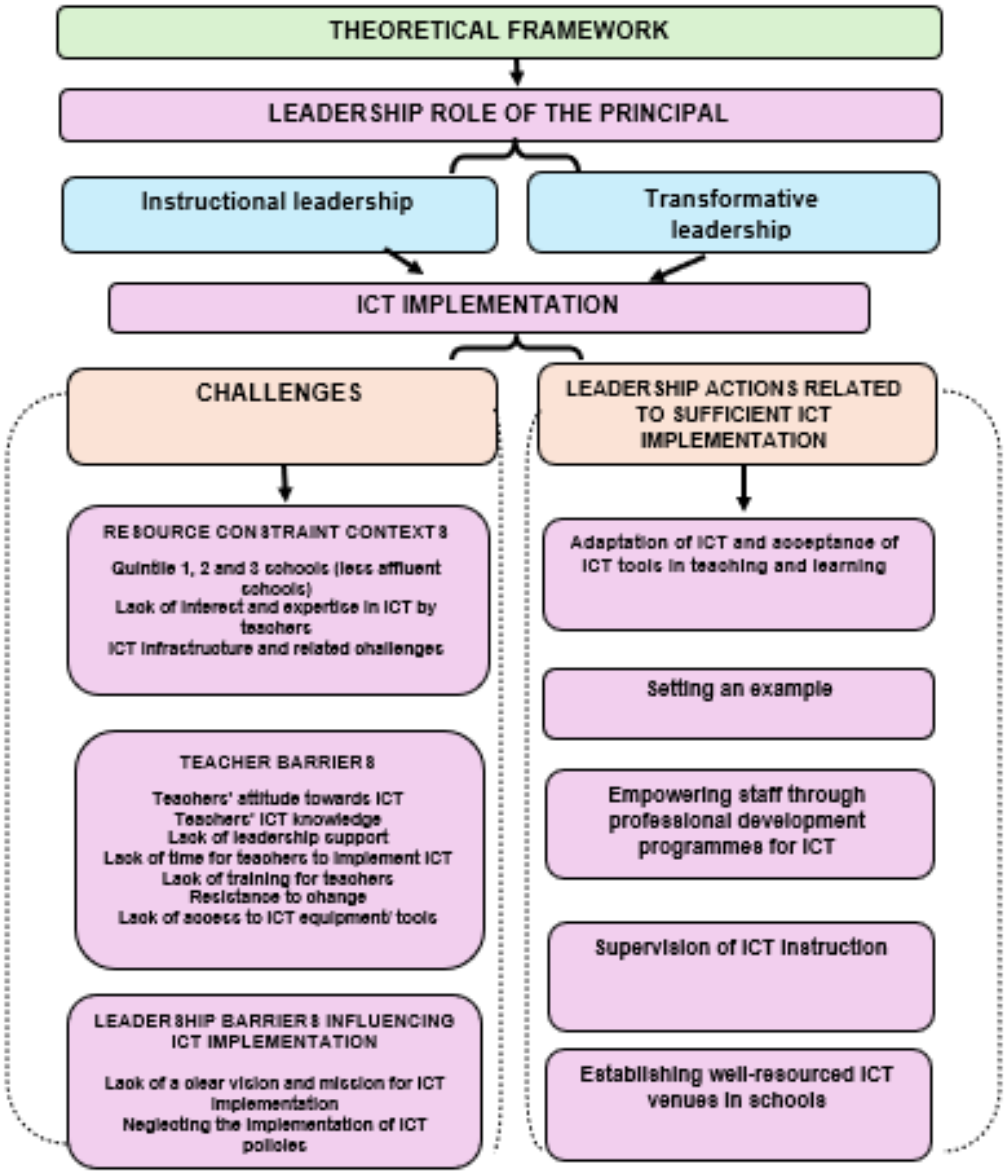

Figure 3.1: Schematic representation of the theoretical framework

3.2.3 Instructional Leadership Theory

The previous paragraphs have dealt with the definition and characteristics of a theoretical framework. The leadership role of a principal is crucial in shaping a school's culture, direction, and success (Memela & Ramrathan, 2022:2). Principals are not just administrators but instructional leaders who set the tone for academic excellence and create a positive learning environment. The instructional leadership role is highlighted as one of the critical leadership theories in the Standard of principalship (DBE, 2016).

Principals are responsible for creating a shared vision for the school that aligns with educational goals and standards. They must communicate this vision to teachers, learners, parents, and other stakeholders to ensure everyone is working towards a common objective (Qadach, Schechter & Da'as, 2020:622). Principals also play a crucial role in fostering a positive school culture by promoting collaboration, respect, and inclusivity among all school community members (Panindranauth, 2023:17).

3.2.4 Origin of Instructional Leadership Theory

During the effective schools movement of the 1980s in the United States, the idea of instructional leadership evolved and took shape (Chikwanda, Masaiti & Banda, 2020:92). Akinyemi and Nkonki (2021) claim that research on schools in underprivileged urban neighbourhoods where children succeeded despite adversity was conducted in the late 1970s and early 1980s, providing empirical support for instructional leadership theory. Solid instructional leadership was usually present in these institutions, including a disruption-free learning environment, well-defined learning objectives, and high instructor expectations. A recent development in leadership styles is instructional leadership (Dian & Sowiyah, 2021:1328). The movement sought to standardise effective teaching practice and saw instructional leadership as the primary source of educational competence (James & Bikar, 2022).

3.2.5 Characteristics of Instructional Leadership Theory

Instructional leaders are committed to lifelong learning and development to strengthen educational programmes and leadership abilities. They keep up with recent approaches and techniques (Culduz, 2024:172). By fostering a positive environment

for professional development, instructional leaders assist adult learners. In addition to rewarding and recognising instructors' efforts for retention and motivation, they promote teamwork, communication, and ongoing learning (Groenewald, Kilag, Cabuenas, Camangyan, Abapo & Abendan, 2024:435). Instructional leaders use a variety of communication methods to consistently express concepts while actively soliciting feedback, involving stakeholders in decision-making processes, and effectively communicating their vision, goals, and strategies (Ramasimu, 2023:52). To foster a collaborative culture, instructional leaders involve parents, community partners, teachers, staff, and learners in decision-making processes. They lay down precise roles, duties, and accountability standards for working across functional boundaries (Eden, Chisom & Adeniyi, 2024:275). Instructional leaders are well-versed in their subject area and pedagogical techniques. They make decisions, plan, organise resources, track results, and keep up with the latest developments in curriculum design and technology integration (Bahtilla & Hui, 2020:84). To ensure effective learning outcomes, instructional leaders use assessment techniques to track learners' progress, pinpoint their strengths and shortcomings, and develop strategies for growth that take engagement and satisfaction into account (Lubbe, Mentz, Olivier, Jacobson, Mackey, Chahine, Belkasim, Jagals, Annandale, Reyneke & Bunt, 2021). By considering the interdependencies between various elements of the educational system they are responsible for, instructional leaders adopt a systemic mindset (Shava et al., 2021:121).

The South African Standard for Principals (DBE, 2016:8-19) outlines expectations for institution functionality and growth, with a specific focus on instructional leadership, and the following characteristics are identified:

- Leading the teaching and learning in the school;
- Managing quality of teaching and learning and securing accountability.
- Managing human resources in the school;
- Managing and advocating extramural activities;
- Developing and empowering self and others (DBE, 2016:8-19).

The South African Standard for Principals policy document outlines the role of principals, while the Personal Administrative Measures document (DBE, 2022) emphasises their accountability for school functionality, instructional leadership, and

performance. Sanchez and Watson (2021:61) claim that managing change, fostering social cohesiveness, and attaining high standards are fundamental components of instructional leadership. According to Ng (2019:4), principals are instructional leaders who focus on improving the learning environment and teaching practices in schools, making instructional leadership the dominant paradigm for school leaders. A clear mission, high teacher standards, a disruptive-free learning environment, well-defined teaching objectives, and learning opportunities should be the principal's top priorities in instructional leadership (Culduz, 2024:171). According to Jackson, McBrayer, Pannell, Cleveland, Miller and Fallon (2021), instructional leadership should be applied to different areas in the school curriculum, defining the school mission, managing the programme, and promoting the school climate.

3.2.6 Application of Instructional Leadership Theory to the study

According to instructional leadership theory, school leaders may improve teaching and learning by establishing clear objectives, assisting teachers, and fostering a continuous improvement culture, especially regarding ICT deployment (Shava et al., 2021:118). By developing a clear vision, coordinating goals, and successfully interacting with stakeholders, school principals can apply instructional leadership theory to the deployment of ICT (Kwatubana, 2023). It takes extensive training and assistance for teachers to use ICT in the classroom successfully, and school principals should provide chances for ongoing professional development that emphasises proper techniques and abilities (Ajani & Govender, 2023:119). It takes extensive training and assistance for teachers to use ICT in the classroom successfully, and school principals should provide opportunities for ongoing professional development that emphasise practical techniques and abilities (Fuad, Musa & Hashim, 2022). To assess the efficiency of ICT adoption, school principals should gather data, observe classes, and get learners' input. This information will help shape future projects (Mapisa & Makena, 2024:215). School principals must ensure that their schools are equipped with the required technology, software, and internet access, as well as technical assistance (Ugur & Koç, 2019:49). School principals should collaborate, communicate openly, and consult with all parties involved in the ICT implementation process, including teachers, learners, parents, and community members (AlAjmi, 2022).

3.2.7 Transformative leadership

3.2.7.1 Origin of Transformational Leadership Theory

The concept of transformational leadership began with James V. Downton in 1973. James Burns expanded on the concept in 1978. Bernard M. Bass further developed the concept in 1985 by including ways to measure the success of transformational leadership (Jauhari, Kumar & Pandey, 2024). Burns' (1978) definition of a transformational leadership strategy provides followers with a sense of fulfilment and encouragement as they strive for increased performance; it also fosters organisational involvement by demonstrating respect and promoting participation in the workplace. People aspire to be like transformative leaders (Khan, Rehmat, Butt, Farooq & Asim, 2020:3; Smith, 2016:66). According to Bwalya (2023:182), transformational leadership theory involves vision, setting direction, restructuring, developing staff and curriculum, and improving standards. A change in leadership research began in the 1990s, with transformational leadership seeking to empower followers, share leadership, and enhance organisational learning. Transformational leadership aims to develop followers and organisations to foster innovation (Yamamoto & Yamaguchi, 2019:48).

3.2.7.2 Characteristics of Transformational Leadership Theory

According to Yamamoto and Yamaguchi (2019:48), transformative leaders foster collaboration and problem-solving by creating conditions that allow teachers to work toward improvement without explicit direction. Teachers must innovate and reflect on their practice to use ICT effectively (Yamamoto & Yamaguchi, 2019:48). Transformational leadership is a style in which individuals influence their superiors and subordinates similarly to their subordinates. It is rooted in a leader's principles and personal views, with ultimate values like justice, fairness, honesty, and honour being absolute (Lin, Xian, Li & Huang, 2020). Transformational leaders foster peace and unity among followers, aligning their aims with corporate objectives (Fareed, Su & Aslam, 2023). According to Bodilenyane and Chinunda (2022:14), transformative leaders communicate their feelings and passion by focusing on employees' interests to build trust and commitment. This leadership style involves acquiring immense power through the mind, becoming inquisitive and constantly learning (O'Donnell, 2021).

According to Khan et al.(2020), the hallmarks of transformational leadership include charm and extraordinary people skills, acknowledging that each individual has remarkable abilities for achieving their and the corporation's goals. The principal promotes a respectful school climate by highlighting each teacher's unique abilities and improving instruction. Members' commitment and capacities are strengthened by transformational leadership, which is based on intellectual stimulation, motivation, and tailored consideration (Kılınç, Polatcan, Savaş & Er, 2024). Bojovic and Jovanovic (2020) state that although devotion and ability alone might not ensure longevity, transformational leadership strives for goal congruence with followers. This emphasises transactional leadership and the need for reward and reinforcement.

3.2.7.3 Application of Transformational Leadership Theory to the study

In the discussions above, the researcher aligned the debate on leadership theories with ICT implementation. School principals are essential to the integration of technology in classrooms because they are frequently entrusted with assuming a leadership role in matters about school development (Ruloff & Petko, 2021:2). Dexter and Richardson (2020:24) view school principals as essential participants in the integration of technology since they oversee all aspects of school growth. Based on these assumptions, the transformative approach, which focuses on encouragement and organisational involvement, will be suitable for addressing ICT implementation. In the field of ICT, this type of leadership may be used to empower teachers. In contrast, a shared leadership approach can be utilised in which the principal shares or distributes ICT responsibilities among the SMT members or other teachers. All of these traits are important for effective ICT implementation. Ligon (2020:2) echoes these ideas and adds that transformational leaders are honest, establish clear objectives, express a vision clearly, lead by example, and acknowledge and celebrate excellence within their companies. Thus, clear goals in terms of ICT implementation, as well as communication regarding the vision of ICT, are essential. Ferguson (2021:22) states that a transformational leader motivates teachers to work toward change. Transformational leaders who inspire teachers to reflect and transform their ICT practices are essential to effective ICT implementation. Transformational leaders combine charisma, inspiration, intellectual stimulation, and individualised consideration. As a result of cultivating a transformational leadership approach, a

transformational leader will change attitudes and transform school leaders' actions (Okeke, 2019:52). As Sattar, Shahrukh, Virk and Butt (2019:4) explain, transformational leadership aims to establish a unified vision and purpose so that staff members work beyond their expectations. A shared ICT vision should guide teachers in the implementation of ICTs. Principals need a shared vision and systems thinking to build a supportive environment. Transformational leadership is crucial to staff perseverance in performing their duties and responsibilities (Magasi, 2021:2). Gacicio, Gakuu and Kidombo (2021) emphasise the importance of transformational leadership in schools, focusing on ICT infrastructure for effective teaching and learning integration, resulting in more motivated teachers. A transformational leader inspires followers to exceed expectations by elevating their interests, nurturing their needs, empowering them, and realising a purpose for living. Teacher commitment and motivation are enhanced by transformational leaders (Yamamoto & Yamaguchi, 2019:48). This leadership approach may be precious if principals elevate their interests in ICTs and empower teachers to improve their ICT skills.

The following paragraphs focus on the resource-constraint contexts regarding implementing ICT in schools.

3.3 RESOURCE CONSTRAINT CONTEXTS

Resource constraints encompass any risk or limitation associated with the resources allotted to projects. Finding these resource management constraints is crucial in project planning, claim Omaran (2021). Resource limitations may cause disruptions to a project and make it more difficult to deliver it effectively.

3.3.1 Quintile 1, 2 and 3 schools (less affluent schools)

There is a great deal of economic disparity in South Africa between the rich and the poor, particularly when it comes to the standard of education across different racial and provincial groups (Makgetla, 2020:51; Spaull, 2015). Using the quintile classification of public schools and the accompanying funding, the government has, since 1994, attempted to close the gap. The community's socio-economic standing determines the classification (Ogbonnaya & Awuah, 2019:108). According to Ogbonnaya and Awuah (2019:1), the South African government has divided the

nation's public schools into five quintiles to distribute funding to address the issue of socioeconomic status and inequality in access to education. Schools were ranked by the DoE in 2010 based on geography and wealth. Quintiles based on the Poverty Index (PI) are used to rank school funding.

- Quintiles 1 and 2 schools are regarded as extremely poor.
- Quintiles 4 and 5 schools are regarded as wealthy.
- Quintile 3 contains middle-class schools.

Schools in quintiles 1, 2, and 3 receive most state funding, whereas quintiles 4 and 5 receive less. Parents of learners receive less money from the government if they can pay the total cost of attendance (White & Van Dyk, 2019:1). According to Ogbonnaya and Awuah (2019) and Chisango and Lesame (2017:50), most of the quintile 1, 2, and 3 schools in these high-poverty areas are township and rural schools. The integration of services for the development of the rural regions is facilitated by ICT, as recognised by the national government (Van Dyk & White, 2019:1; Chisango & Lesame, 2017:50). Power supply is a significant issue in rural areas, where uncertain, undeclared power cuts are a probability. A proper power supply must be maintained for the smooth running of systems and programmes. According to Afzal, Khan, Daud, Ahmed and Butt (2023:884), another issue is a lack of computer resources, particularly in distant areas. It's also a significant problem to balance the number of learners and systems in educational institutions. According to Fomunyam (2019:31), in nations like South Africa, where obtaining consistent electricity, particularly in rural areas, is a significant challenge, more schools find it difficult to use ICT facilities, even when they do have them due to insufficient power.

South African township schools are among those where teachers integrate ICTs at a lower level due to a lack of resources. The government and other sponsors have provided digital technologies to these schools to close this gap. Teachers have received basic ICT skills training to prepare them for using technology in the classroom (Munje & Jita, 2022:265). The South African government has called for "workable" solutions due to research done to assess the efficacy of these interventions. Nevertheless, It is becoming increasingly clear that achieving ICT integration will require more than digital resources (Munje & Jita, 2022:265; Ndlovu, 2015: ii). According to Aikins and Arthur-Nyarko (2019), ICT can help communities and marginalised groups have equal opportunities. However, the irony is that ICT is

another tool to widen the gap for the groups behind the digital divide. It follows that education is anticipated to be crucial in resolving this issue. ICT plays a critical role in education, especially for low-income and remote rural communities, according to Yamamoto and Yamaguchi (2019:46). ICT enhances learning resources and tools while facilitating connections between teachers and learners outside the classroom. Although ICT was promoted before COVID-19, its utilisation became increasingly imperative as COVID-19 caused disruptions in the global education system (Antón Sancho, Fernández Arias & Vergara Rodríguez, 2023). Curricula based on technology require strong leadership. Kwatubana (2023:187) highlights that leaders must create, direct, oversee, and apply technology to various organisational operations to enhance performance.

3.3.2 Lack of interest and expertise in ICT by teachers

Due to their lack of experience and fear of making mistakes, teachers are frequently reluctant to employ ICT in the classroom, undermining its effectiveness and use. (Molotsi, 2022:2; Albugami & Ahmed, 2015:46-47). Umugiraneza, Bansilal and North (2018:11) aver that the younger generation of teachers is more confident and does not require as much support as their older counterparts do. The responsibility of technology leadership is formally mandated, but many school leaders are still not confident about technology (Kwatubana, 2023:188). Compared to remote rural teachers, urban teachers are more open to the use of ICT (Wu et al., 2022). A study by Mwapwele et al. (2019:16) found that rural teachers were positive about ICT but reluctant to use it. Lin, Chu, Yang, Lou, Yu and Yang (2023:2) speculate that rural and urban teachers have differing ICT attitudes, which results in differing digital teaching abilities, by fostering a culture of innovation, empowerment, and collaboration, principals as transformative leaders can inspire positive changes that enhance teacher proficiency in integrating technology into classroom practices (Schmitz et al., 2023).
Next is a discussion on the importance of ICT infrastructure in implementing ICT in schools.

3.3.3 ICT infrastructure and related challenges

ICT infrastructure – computers, interactive whiteboards, and an internet connection – is necessary for teachers to use ICT. Still, it frequently gets in the way of creating new learning environments (Lomos et al., 2023:4). ICT infrastructure offers a classroom environment where learners may work together, solve problems on their own, and think independently (Bariu, 2020:4).

3.3.3.1 In rural areas

Teachers and learners can change teaching, learning, and assessment practices in a 21st-century education system by utilising ICT infrastructure (Murithi & Yoo, 2021:4). The technological infrastructure includes both hardware (phones, laptops, etc.) and connectivity (internet connection, electricity, etc.) (Zecheria, Ștefănigă, Negru & Virag, 2020:75). Rana, Greenwood, Fox-Turnbull and Wise (2020:2) list a few of the primary barriers to ICT proficiency in remote schools, including a lack of energy, internet connectivity, inadequate supporting infrastructure and security. Even though school infrastructure has been substantially funded in South Africa, a study by Rana et al. (2020:2) has found that electricity and internet access are still unavailable in deep rural villages. Unemployment makes internet costs an impossibility for many people. Affirming Fomunyam's (2019:30) point, African countries have not yet taken full advantage of ICT. ICT facilities are far below standard among the continent's primary and secondary schools. This is due to a lack of ICT infrastructure in Africa compared to Western countries. The lack of ICT infrastructure and facilities compromises the privileges that pupils are expected to have in their education (Nsama, Mwale-Mkandawire, Lisulo, Hamweete & Eunifridah, 2021:274). Dawes (2023) claims that implementing transformative leadership in education can yield positive outcomes by tackling issues such as insufficient ICT infrastructure, promoting creativity, self-determination, teamwork, and organising digitally ready learning spaces.

The dearth of ICT facilities means that many African schools lack the primary resources needed for an ICT-based curriculum (Fomunyam, 2019:31). According to Chisango and Marongwe (2021:155), small schools' budgets make ICT infrastructure a challenge. For an adequate ICT-based curriculum, sufficiently equipped computers, fast internet connections, printers, multimedia projectors, and scanners are among the

resources needed to implement school ICT policies. Not all educational institutions have these tools (Greunen et al., 2021; Francis et al., 2017:75); however, it must be kept in mind that an effective and well-maintained ICT system cannot help but facilitate the shift from transmission to inquiry learning (Molotsi, 2022; Alkahtani, 2017:32). School principals must collaborate to ensure that instructional leadership takes on the responsibility of addressing the issues brought about by the lack of ICT infrastructure (Karakose, Pola & Papadakis, 2021).

3.3.3.2 The digital divide

Since 1994, South Africa's democratically elected government has reduced racial discrimination in social spending and ensured equitable public school funding, as per the South African Schools Act (SASA) 84 of 1996 (White & Van Dyk, 2019:1). Schools are categorised into five quintiles, with quintile 1 being the poorest and quintile 5 being the least poor. Schools in townships, rural areas, or informal settlements can qualify for the first quintile or highest subsidy levels (Naicker, Myende & Ncokwana, 2020). Mestry (2020:1) reveals that schools in less affluent communities receive more state funding than those in affluent ones. The budget for allocating non-personnel resources to these schools –categorised as quintiles 1, 2, and 3 – is seven times greater than that of wealthy schools. Schools in quintiles 1 through 3 receive additional state funding and are not required to collect school fees because they are in disadvantaged areas. Quintiles 4 and 5 have fee-paying schools (Mabula, Khalabai & Simeon, 2023:3). According to Soudien, Reddy and Harvey (2022:311), quintile 1 schools are the worst because of their inadequate facilities and high learner-teacher ratios. Compared to quintile 5 schools, which have better facilities, more supportive parents, and learners from middle-class families, quintile 1 schools receive more state funding. However, because of pervasive problems like poor leadership and teacher absenteeism, the quintile-funding model has not been able to reduce inequality. According to Sithomola (2022:105-107), the COVID-19 pandemic revealed disparities in the international education system, notably in South Africa. Many learners, particularly those in quintiles 1, 2, and 3 schools, cannot access quality education because of their socio-economic status. This unequal education has been a government issue since 1994, as they are funded by the state, making access to modern technology and private tutoring difficult.

It is evident in South Africa that there is a vast difference in the quality of education between the private schools and the government schools, with the issue of race a thorny issue still. Under-resourced schools tend to have a large black learner population (Duma, Mlambo, Mbambo-Mkwanazi & Morgan, 2021). During the mid-2000s, the South African Department of Basic Education began providing schools with technology infrastructure, but this ICT drive was uncoordinated, leaving some rural areas behind. To meet ICT infrastructure obligations, the DBE partnered with other government departments, non-governmental organisations, and private donors to provide teachers with technology infrastructure (Mahwai & Wotela, 2023:56). According to Pillay (2021), it is not surprising that South Africa lags in digital transformation while it focuses on the fourth industrial revolution (4IR) regarding digital applications. South Africa must emphasise building citizens' optimism through access to and skills to operate technology to achieve the 4IR's benefits. Several issues, such as the overall absence of service provision in rural areas, the lack of data infrastructure, and its high costs, make digital technologies a focal point for digital inequality (Duma et al., 2021:6). A more open-ended learning environment develops higher-order thinking, creativity, independence, collaboration, and ownership of knowledge. Effective use of ICT infrastructure can allow all educators, learners, and parents/guardians to do so. ICT adoption and integration in teaching and learning are hampered by the lack of ICT infrastructure (Bariu, 2020).

The digital divide in South Africa is growing despite installing ICT infrastructure in impoverished areas, and access to such infrastructure does not guarantee ICT skills (Chisango & Marongwe, 2021:151). Principals are responsible for planning, organising, and securing resources for technology use and integration within their schools. Resource allocation practices must be central to improving instruction to improve the ICT curriculum (Kwatubana, 2023:188). The principal must ensure accessible resources for teaching and learning, including adequate ICT facilities for teachers and learners, to effectively utilise ICT in education (Etor, Mbon & Ekanem, 2020:65). As a result, teachers may adopt ICT in their teaching, and school managers must ensure that schools are well equipped with ICT infrastructure. Furthermore, this infrastructure motivates teachers without ICT skills to acquire the skills to use the infrastructure (Ndiritu, Gichimu & Ndiritu, 2018:29). Transformative and instructional leadership are crucial in bridging the digital divide by promoting equality, inclusivity,

and innovation in educational settings, fostering a more digitally inclusive society through strategic planning and collaboration (Pittman, Severino, DeCarlo-Tecce & Kiosoglous, 2021). Financial challenges will be discussed in the subsequent paragraphs.

3.3.3.3 Financial challenges

It can be quite costly to introduce ICTs in education because of the up-front costs of acquiring basic infrastructure (Haleem et al., 2022:277; Angadi, 2016:202). ICT has played a significant role in the education budgets of many nations. Since the late 1990s, strategic plans have been developed to enhance ICT investment in education (Alenezi, 2019:223). In many developing countries, implementing significant ICT is a challenge due to the perceived cost of investing in ICT. The high cost and maintenance of ICT infrastructure have hampered the adoption and implementation of ICT in schools. Mwapwele et al. (2019:3) agree that developing countries, like South Africa, allocate funds for maintaining existing processes but don't fund changes or new initiatives.

According to Ntorukiri, Kirugua and Kirimi (2022:2), ICT implementation requires substantial investment. Due to financial constraints, governments of developing countries like South Africa spend most of their educational budget on teachers' salaries and the rehabilitation and maintenance of school buildings. Brown (2019:7) and Alkahtani (2017:34) state that computers and computer-based equipment are expensive if not properly maintained. The COVID-19 pandemic, according to Chukwu-Okoronkwo (2021:1), led to a global lockdown that affected everything, including education. Since education occupies a significant position in the lives of many nations, many people and organisations have argued that electronic learning offers a solution to such challenges.

The financial implications of using ICT cannot be fully appreciated without considering its benefits and uses. Despite infrastructure and programme design issues, the associated cost is the greatest obstacle to expanding ICT use (Munje & Jita, 2020:271). As rural schools adjust to the growing amount of online knowledge acquisition in the information era, they encounter difficulties because of the high cost of ICT resources, internet connectivity, and electricity (Mngadi, 2021). Transformative

leadership encourages innovation in educational institutions, while instructional leadership improves teaching practices and learner outcomes. ICT use in education involves initial investments, maintenance, and professional development expenses (Meladi & Awolusi, 2019:49). A discussion on ICT implementation in schools and its lack of technical support follows.

3.3.3.4 Lack of technical support

Technical support refers to specialised, skilled personnel assisting teachers with technology implementation. Technical support is also accessing, operating, and troubleshooting hardware, software, and network resources (Ochieng, Asego & Gyasi, 2023). Technical support is required in schools to improve teachers' performance when integrating ICT into teaching and learning. A person who does not understand technological devices can easily break them. Mahlo and Waghid (2022) and Hadijah and Shalawati (2017:308) state that most schools rely on computer teachers who know computers well. Chigona, Chigona and David (2014:5) and Khatoony and Nezhadmehr (2020:92) argue that teachers are demotivated from implementing technology in their teaching because they lack efficient technical support. They add that teachers don't want to experience a simple fault in the laboratory without technical support. The time teachers work is limited, so that technical errors would waste time. As Odhiambo (2019) conclude, technical difficulties can become a significant problem in schools, causing frustration for learners and teachers. Teachers will be discouraged from using computers because of the lack of support and concerns about equipment failure. Instructional leadership helps bridge technology difficulties and curriculum goals by advising, preparing, and supporting teachers in successfully integrating technology into lessons despite technical difficulties (Sera-Sirven, 2021).

Internet connectivity is another problematic issue. Alenezi (2019:225) suggests that poor internet connectivity discourages teachers from using educational technology. ICT support services and ongoing maintenance are crucial in helping schools implement ICT effectively. Hadijah and Shalawati (2021) identify general technical support and infrastructure competencies, such as installation, operation, maintenance, and network administration. Technical breakdowns can cost a lot of time and money without on-site technical support. Technical support specialists are essential to the

long-term viability of ICT use in any school. Technical specialists for eLearning must possess general competencies in network administration, network security, and the installation, operation, and maintenance of technical equipment (Hammou & Elfatihi, 2021). Technical malfunctions might cost a lot of money and time if there is no on-site technical support. The literature has a wealth of information about the significance of technical support, which underscores the fact that the expertise and calibre of technical support offered to end users by the "IT division" can make or break an e-learning project (Timotheou et al., 2022:6726).

Teachers are naturally apprehensive about utilising technology in the classroom because they are concerned about potential technical issues. Tiba and Condy (2021:300) opine that several studies have shown that school technical assistants encourage teachers to incorporate technology. In addition, technical assistants are reliable and quick to respond to technical problems. According to these studies, some schools employ technical assistants, but they are few, and the assistants struggle to assist learners and teachers. Since technical problems are likely to occur during classes, teachers need to be able to handle them so that they can quickly resume teaching and learning (Tiba & Condy, 2021:300). A school that lacks sufficient technical support may find it challenging to carry out preventive maintenance regularly, which increases the likelihood of technical malfunctions. The schools without technicians often experience "software glitches". The absence of technical support may indicate that breakdowns last longer (Ochieng et al., 2023). Therefore, the school principals must articulate a clear technical support strategy that involves training technical staff to implement ICT integration easily. The technical support team oversees ICT integration in the classroom before, during, and after, ensuring that any technological issues are resolved (Razak, Jalil & Ismail, 2019:189). By embracing transformational leadership principles, educational institutions can overcome the barriers posed by a lack of technical support in schools and create a conducive environment for effective technology integration that enhances teaching and learning experiences (Ferguson, 2021).

3.3.4 Summary of resource constraint context

The above paragraphs explain the challenges that schools are experiencing due to resource constraints. The challenges mainly apply to schools in quintiles 1, 2, and 3 (less affluent schools). Factors such as a lack of interest and expertise in ICT by teachers, inadequate ICT infrastructure, financial challenges, and a lack of technical support are some of the most pressing challenges that are experienced. The role of the principal was briefly alluded to but will be elaborated upon further under 3.6. As Okeke (2019:54) further notes, this is particularly crucial as digital-savvy school principals must give teachers the right technology resources, facilities, support, and help when needed.

Any ICT implementation strategy should consider the barriers that may hamper it. As the previous paragraphs indicated, the context has a significant influence. Teachers play a crucial role in ensuring that ICTs are being implemented. Next, therefore, a critical look will be taken at barriers relating to teachers.

3.4 TEACHER BARRIERS

In education, a “barrier” is defined as “any condition that makes progress or achieving an objective difficult.” Barriers are any hindrances or challenges teachers encounter when teaching 21st-century skills in classrooms (Chun & Abdullah, 2022:17). In the next paragraph, ICT-related barriers will be discussed.

3.4.1 Teachers’ attitude towards ICT

Negative attitudes and beliefs of teachers can be significant barriers to ICT implementation. Using ICT is influenced by teachers' competency and by their attitudes toward technology (Hammou & Elfatihi, 2021). Akram, Abdelrady, Al-Adwan and Ramzan (2022:2) believe teachers' perceptions and attitudes are vital to integrating ICTs. Teachers' attitudes, perceptions, and competence are significant in integrating ICT into teaching. For example, teachers may not embrace technology. Fernández-Batanero, Román-Graván, Reyes-Rebollo and Montenegro-Rueda (2021:2) point out that teachers still think technology is unnecessary. Lack of experience or ability to adopt ICT in education can lead to this attitude. There may be

a lack of ICT training and education or simply a dislike of the technology. Studies by Mlambo, Rambe and Schlebusch (2020:2) and Adegbenro, Gumbo and Olakanmi (2017:81) found that teachers with low self-efficacy do not accept computers as teaching tools.

Stumbrienė, Jevsikova and Kontvainė (2024) note that teachers must shift from ICT users to ICT leaders in technology-enabled classrooms. However, this is impossible without their active participation. As teachers have a challenging and demanding role to play in education, they need ICT to cope effectively. In addition to computer anxiety, teachers are often hesitant to adopt and use technology (Mensah & Osman, 2022:115; Razzak, 2013:3). Using technological tools in the classroom requires teachers to believe they can use them effectively to achieve important instructional objectives. Whether teachers implement ICT effectively depends mainly on their own perceptions of their ICT proficiency (Mlambo et al., 2020:2; Chaaban & Ellili-Cherif, 2016:2). Additionally, Chomunorwa, Mashonganyika and Marevesa (2022) and Raj (2017:266) suggest that older teachers and teachers in remote areas are less likely to use new technology since they are less exposed to new technologies. According to Mensah and Osman (2022:113), teachers' attitudes and expectations regarding the integration of ICT are shaped by their beliefs, and optimism plays a critical role in the successful execution of lessons. Challenges with perceived competence and old ways arise from digital incapacity. Although teachers are ICT trained, they still fear making “technical mistakes” in class (Chisango, Marongwe, Mtsi & Matyedi, 2019:4). Transformative leaders who promote a culture of innovation and collaboration are more likely to encourage teachers to explore new technologies and incorporate them into their teaching practices (Baker-Doyle, 2021). On the other hand, instructional leaders who focus on improving instructional practices may provide support and resources for teachers to enhance their ICT skills and use them effectively in the classroom (Ismail, Muhammad, Omar & Raman, 2020: 2439).

3.4.2 Teachers’ ICT knowledge

According to Lawrence and Tar (2018:96), ICT knowledge is teachers' capacity to use various technology-related resources in the classroom. ICT adoption and integration in teaching and learning are thought to be significantly hampered by a lack of ICT

understanding. This is particularly true as teachers' ICT proficiency and expertise have an impact on learners' ICT learning (Molotsi, 2022:2; Lawrence & Tar, 2018:96). The use of ICT in education may be hindered or enhanced by teachers' knowledge and experience, according to Molotsi (2022:1). The use of ICT materials and teaching aids does not affect teaching with technology if a teacher has insufficient knowledge of how to use them (Molotsi, 2022:1). ICT use by teachers is essential for instruction, according to Aikins and Arthur-Nyarko (2019:486-7). Teachers need training in ICT skills to use ICT equipment and the internet and integrate these into teaching without feeling uncomfortable. Professional development opportunities are required for ICT pedagogy and subject-specific learning applications (Aikins & Arthur-Nyarko, 2019:486-7). Learning ICT is extremely important for teachers to effectively teach with ICT since it will help them integrate technology into classroom instruction (Juggernath & Govender, 2020:3; Bhattacharjee & Deb, 2016:1-2).

In an ICT-enhanced classroom, Abdulrahaman et al. (2020:12) suggest that technology knowledge involves more than simply mastering hardware and software. An example of this would be knowing how to use an advanced search tool online but being incompetent in applying it to solve problems. A study by Shoraevna, Eleupanovna, Tashkenbaevna, Zulkarnayeva, Anatolevna and Nurlanbekovna (2021:263) states that teachers should maintain their knowledge of ICT. Dele-Ajayi et al. (2021:2) and Karunaratne et al. (2018:134) suggest that teachers lack basic computer skills despite participating in workshops on learning management systems. Teachers lack expertise despite their ability to implement projects. It may be challenging to implement ICT initiatives because of a lack of experience and competence, while teachers are worried about showing their technological ignorance in front of their learners. To integrate technology into teaching and learning, teachers need to combine technological, pedagogical, and content knowledge, according to Adipat, Chotikapanich, Laksana, Busayanon, Piatanom, Ausawasowan and Elbasouni (2023:174). Understanding pedagogical affordances and technology tools is crucial to learning.

Teachers must develop their professional skills to implement ICT in teaching and learning successfully. Furthermore, learning how to use ICT to enhance learning requires more than basic ICT skills (Aikins & Arthur-Nyarko, 2019:487). Schools in quintiles 1 to 3 adopt the lowest level of ICT, and the lack of adequate security makes

matters worse because equipment is stolen, leaving teachers without computers to develop their skills. Schools in quintiles 4 and 5 generally have a professional development programme for their teachers as well as technology resources (Dlamini & Dewa, 2021:30). Transformative and instructional leadership styles can significantly impact teachers' ICT knowledge in educational settings by empowering them, providing professional development opportunities, articulating a clear vision for technology integration, and fostering a collaborative culture of continuous improvement (Bellibaş, Kılınç & Polatcan, 2021:798).

3.4.3 Lack of leadership support

Providing teachers with financial and psychological support is the responsibility of a school leader. Principals must work with school staff to implement long- and short-term ICT integration plans (Yamamoto & Yamaguchi, 2019:8). The computer ratio accounts for technology, teacher needs, and annual goals, supporting academic activities with one device per learner. It is vital for a school's technology plan to purchase new devices, replace old and slow ones, and stay wireless. Teachers should be encouraged by their principals and other teachers to use ICT, according to Kafu-Quvane (2022:2) and Alkahtani (2017:34). It is important to note that school principals are vital drivers of ICT use in schools as they influence teachers' attitudes toward computer use. According to Apsorn et al. (2019: 643), school leaders should become familiar with the capabilities of modern technology. According to Usman (2020:101), investing in leadership development programmes that emphasise transformational leadership skills can also help build capacity among current and future educational leaders to drive positive change within their organisations.

According to Apsorn et al. (2019: 641), educational technology problems are primarily the result of administrators' inability to prepare. Some administrators do not consider Information technology and innovation important, as knowledge, experience, and expertise in media and information technology are lacking. In schools, good leadership requires effective technology use. ICT strategies are more likely to succeed and be effective when school leaders support ICT strategies (Yamamoto & Yamaguchi, 2019:48). Tigere and Netshitangani (2022:20023) and Uluyol and Sahin (2016) explain that leadership support has been ignored despite considerable investments in

technology. School principals must commit to its full integration for ICT to be effective. By valuing instructional leadership, school principals can create a more balanced and effective approach to leading during times of uncertainty (Aguilar, 2024).

3.4.4 Lack of time for teachers to implement ICT

The lack of sufficient time for technology preparation and implementation may be challenging. Teachers often report that incorporating technology into their lessons requires significant time and work (Mohebi & David, 2019:4-5). School-wide adoption of new technology can be time-consuming, and teachers should be provided with extended support (Haleem et al., 2022:276). As Lawrence and Tar (2018:97) point out, teachers lack the time to integrate ICT effectively into their curricula. Teachers are expected to provide learners with relevant and exciting learning materials, so teachers must spend more time preparing all things well to integrate ICT into teaching and learning (Lomos et al., 2023:20). Teachers will need extra time to use technology-based learning tools since they will need to plan lessons, investigate, practise using resources, and solve challenges (Lodge, Kennedy, Lockyer, Arguel & Pachman, 2018:3). Due to their busy schedules, teachers have difficulty integrating ICT devices during teaching and learning time (Mlambo et al., 2020:2). According Mayantao and Tantiado (2024:1946), the most frequent complaint from teachers is that they don't have enough time to organise technological classes, check out various websites, or investigate instructional software. Kim (2022) recommends that the teacher master the technology before deciding how to integrate it with classroom objectives. While instructional leadership is vital for successful technology implementation in education, various challenges, such as lack of preparation, must be addressed to ensure effective integration (Uygur, Ayçiçek, Doğrul & Yanpar Yelken, 2020).

Learning how to use hardware and software, as well as planning and collaborating, requires time management, as does implementing ICT (Lomos et al., 2023:5; Sultana & Haque, 2018:71). According to Varghese and Chandrashekar (2017:4056), teachers have too much work to complete within the stipulated working hours, resulting in overworked teachers who struggle to keep up with educational advances. Another contributing factor possibly leading to failure, according to Karunaratne et al. (2018:134), is poor time management. Change is resistible because it requires

additional commitments, time and effort. According to Haleem et al. (2022:277) and Alkahtani (2017:34), schools should adjust their schedules to allow teachers more time to plan lessons with ICT than they do without it. Teachers are very concerned about not having enough time for technology; they say they need more time to learn computers, plan how to use technology, and employ it in class. Teachers believe that a great deal of skill is required to use ICT resources appropriately, and they complain about the lack of time preventing them from utilising ICT resources effectively (Benmansour, 2019:344). Benjamin, Baudoin and Jean-Pierre (2022:162) recommend that school principals motivate and support teachers to utilise ICT effectively. They should ensure teachers have enough time to utilise ICT at school effectively.

3.4.5 Lack of training for teachers

Based on the tenets of constructivism, teachers require specific training, expertise, and skills transfer in using technology (Maruping & Velempini, 2022:201). It is necessary to develop teachers' skills to integrate computers into classroom teaching (Zhang, 2022:2; Wachiuri, 2015:28). A pre-service teacher education programme cannot be complete without proper knowledge of ICT, according to Pozas and Letzel (2023:824). To use ICT effectively, teachers and learners need ICT training at both pre-service and in-service levels, Mwila (2018:228) suggests. Implementing ICT in the teaching and learning process requires teacher training, solving pedagogical issues for teachers, and ICT competence and computer self-efficacy (Lomo, Luyten & Tieck, 2023). It is crucial to integrate new technologies into the classroom and to train teachers to utilise them effectively, as suggested by Seufert, Guggemos and Sailer (2021:2). For teachers to use computers effectively, they must develop the appropriate skills, knowledge, and attitudes. When using ICT in the classroom, teachers face several problems, including a lack of training (Murithi & Yoo, 2021). Training effectiveness requires consideration of several aspects. Teacher training includes pedagogical training, skills training, and ICT training, and it is crucial to prepare teachers for such training (Chisango & Marongwe, 2021:152; Habibu, Abdullah-Al-Mamun & Clement, 2012:5). Transformative leadership in education is vital for promoting positive changes, including addressing teachers' lack of ICT training. It involves professional development, collaboration, mentorship, policy support, and technology partnerships. Transformative leaders can empower teachers with the

necessary skills to leverage technology effectively in their classrooms (Baker-Doyle, 2021).

Teacher leaders are school-based developers who facilitate effective professional development. Consequently, teacher leaders support colleagues in strengthening their teaching practices (Dlomo, 2021:15). As Nasreen (2019:175) argues, principals and teachers are equally responsible for creating an environment conducive to learning in schools. The school should have a well-balanced development programme for teachers and principals to enable them to integrate ICT effectively. Professional development for teachers can help them acquire basic ICT skills and improve their confidence, and it can help them use technology to enhance learner development in 21st-century competencies (Chabalala & Naidoo, 2021:13).

The technology leader provides the training necessary to assist staff in integrating technology into the school. This can include conferences, workshops, seminars, and peer coaching based on the school's needs. Staff development that improves teacher and pupil performance usually supports the school's ICT vision and mission (Okeke, 2019:54). The principal must create a vision for effective technology integration and provide ongoing support for teachers (Sterrett & Richardson, 2020).

3.4.6 Resistance to change

To implement ICT, teaching pedagogies must shift from teacher-centric to learner-centric. Technology-enabled classrooms require teachers to change from ICT users to ICT leaders. Change cannot be achieved without the active participation of teachers. To bring this change, teachers must change their mindset Dunstan and Ismail, 2024). Hasin and Nasir (2021:60) report that ICT in schools has led to administrative and communication function changes. ICT can have a significant impact on learners' performance in the classroom. Teachers' hesitancy to use ICT results from several factors, including teacher competence, school digital infrastructure, technophobia, and access to ICT tools (Omboto, 2022; Albugami & Ahmed, 2015:41).

Reforms and change are often not successfully implemented in an organisation because of "blocking forces" (Scholkmann, 2021:222). The diffusion of technology in the education system is hindered by two significant factors: organisational-management factors that limit pedagogical and technological adaptations and

personal characteristics, such as teachers' perceptions and beliefs regarding ICT implementation (Barrot, Llenares & Del Rosario, 2021:7325). Similarly, Singh et al. (2021:150) and Albugami and Ahmed (2015:47) identify teachers' resistance to change as barriers to utilising technological advances. Teachers also face difficulties using computers in class due to their abilities, school digital infrastructure, and access to ICT tools. Haleem et al. (2022:276) highlight how crucial it is for teachers to overcome obstacles when using technology in the classroom. Fostering a culture of innovation and collaboration, instructional leaders can help schools successfully implement ICT while mitigating resistance to change (Perrault, 2022:20).

3.4.7 Lack of access to ICT equipment/ tools

With the growing use of ICT, teachers will need access to materials and services related to ICT (Makgati & Awolusi, 2019:95; Augustine, Daud & Kamaruddin, 2018:31). According to Benmansour (2019:343), teachers' lack of access to technology is the main barrier to integrating ICTs into the classroom. Firstly, ICT infrastructure is essential to effectively and successfully use ICT in the classroom. By taking proactive steps to address the lack of access to ICT equipment in schools, instructional leaders can create a more inclusive learning environment where every learner can thrive academically and develop essential digital literacy skills (Ismail, et al., 2020:2439). ICT training is essential to introduce creative teaching methods and techniques in schools (Bariu, 2020:2; Wajszczyk, 2014:11), as noted by Munje and Jita (2020:266). Therefore, technology integration involves access to equipment required to run educational computer programmes. In schools, the effectiveness of ICT resources for teaching depends mainly on the availability and accessibility of these resources. It is unlikely that teachers will use ICT resources in their classroom activities if they do not have easy access to such resources (Molotsi, 2022:1). In a study conducted by Benmansour (2019:345), it is reported that there were complaints among teachers about the difficulty of having access to computers, such as "computers were reserved in advance, but teachers often forgot to do so, or teachers could not book computers for multiple periods when they wanted to work on multiple projects with learners." Because most ICT materials were shared with other teachers, a teacher would not easily access them (Benmansour, 2019:345). Through strategic planning, advocacy, professional development, and monitoring, transformative leadership can address

school ICT equipment shortages and promote digital equity among learners by empowering them with equal learning opportunities (McCarthy, Maor, McConney & Cavanaugh, 2023). Additionally, Dlamini and Dewa (2021:30) explain that principals in quintiles 1 to 3 schools had strict rules to protect computers, making it difficult to access them continuously; this may also contribute to low levels of adoption.

3.4.8 Summary of teachers' barriers to implementing ICT

In the previous paragraphs concerning teachers' barriers when implementing ICT in the classroom, the researcher has dealt with teachers' attitudes towards ICT, teachers' ICT knowledge, leader support, lack of time for teachers to implement ICT, lack of ICT training for teachers, resistance to change and the lack of access to ICT equipment and/or tools. The principal's role in addressing these barriers has also been discussed. It appears that leaders contribute significantly to the challenge of ICT implementation. In the next section, leadership barriers influencing ICT implementation will be dealt with.

3.5 LEADERSHIP BARRIERS INFLUENCING ICT IMPLEMENTATION

Technology integration requires leadership to prepare today's learners with relevant knowledge and skills as leaders guide teaching-learning (Reganon, 2023:94; Gupta, 2016). Education leadership programmes may prepare school leaders, but few integrate technology. Developing a system that supports their unique school environment is essential to prepare school leaders for technology implementation. For a digital culture to succeed, leaders must communicate, motivate and engage stakeholders (Christensen et al., 2018:9). The barriers to this, which are related to the instructional leadership role of the principal (Plaatjies, 2019:2020), will be addressed in the following paragraphs.

3.5.1 Lack of a clear vision and mission for ICT implementation

As the goal of school activities, the vision and mission of the school serve as the foundation for quality service. Still, in many schools, the vision and mission merely exist and are not the meaningful guidelines for education delivery that they ought to

be (Sulastri, Syahril & Adi, 2020:363). Apsorn et al. (2019: 640) mention that while school leaders may develop a vision and inspire others, many schools lack guidelines to support teaching and learning due to a lack of school vision, specifically on ICT. As Razak et al. (2019:189) point out, leaders must develop a vision for effective use of technology that should be reflected in all aspects of ICT implementation. The ability to create a vision and mission forms part of the characteristics of both instructional and transformational leaders (Kwan, 2020:321).

According to Zeng (2022:1061), many schools lack ICT guidelines to support their curriculum. School-related policies, such as ICT plans, ICT support, and ICT training, significantly impact ICT use in schools. In studies by Reganon (2023:94) and Christensen et al. (2018:1), technology integration leaders lack professional development to support their role. The traits of an effective ICT school leader include creating a shared vision, remaining pedagogically focused, and seeking continued professional development. This aligns with the instructional leadership approach stipulated in the Standard (DBE, 2016).

3.5.2 Neglecting the implementation of ICT policies

In different countries, ICT-integrated classrooms may have other effects and paths. Education policies regarding factors such as the status and role of the teacher can shape a country's culture regarding ICT (Cha, Park & Seo, 2020:9). Another challenge faced by ICT leaders is the lack of policy and best practice guidelines that are needed to understand how ICT can be integrated into the curriculum, as Kennedy (2023:862) points out. Many countries have established ICT policies, according to Mathende and Beach (2022:80) and Hashim (2015). Generally, South African ICT policy problems are related to funding challenges, and in particular, a lack of funds (Makgati & Awolusi, 2019:54; Conger, 2015). Alenezi (2019:230) argues that the absence of a strategic policy framework hinders ICT integration in schools. For years, and in many nations worldwide, ICT has been used in education exclusively to facilitate administrative tasks, with ICT management policies lacking in schools. Makgati and Awolusi (2019:54) and Kamalizeni and Naidoo (2018:104) argue that ICT management training should be offered to managers, together with a shared vision about technology integration and an ICT policy plan. Education ICT policy plans increase ICT integration

success. In addition to outlining how ICT should be used in education, a national, district, or institutional ICT policy plan should outline learning objectives for ICT, making it a strategic tool and potentially driving educational change (Van Greunen et al., 2021:2; Cifuentes & Vanderlinde, 2015:134). Transformative leadership is crucial for promoting positive change in education, particularly in implementing ICT policies. By prioritising technology integration, schools can foster innovation, collaboration, and learner success (AlAjmi, 2022).

Schools that wish to adopt an ICT policy must have a culture of support, forward-thinking leadership, and instructors who know the policy's requirements. Teachers need to be recognised as critical players in implementing educational policies at all levels of the system – national, provincial, district, and local school contexts. Disregarding teachers' opinions, we lose out on the classroom expertise and experience teachers can offer in creating policies (Vandeyar, 2021:44-45). Principals impact teachers' beliefs, motivation, dedication, and capacity for problem-solving (Cohen, 2019:557). In these roles, as information drivers and policy translators, teachers and parents need direct access to the policy document to inform ICT curriculum implementation. School-based strategies must be developed to ensure teachers align their key and daily activities with the government's e-education strategy. When teachers in a school share a similar understanding of the processes of ICT curriculum in line with e-education policy, the ICT curriculum can thrive (Kwatubana, 2023:189). ICT implementation involves concrete steps at the school level to leverage both the e-leadership vision of the principal and the government's ICT policy. Various factors need to be considered in developing ICT strategies, such as infrastructure deployment, resources, curriculum materials, and technical and administrative support (Wu et al., 2019:1212). Leadership and policy support must include defining how digital technologies should be utilised in education, guiding learners and parents, providing logistical support, and training teachers. ICT integration cannot be sustained or become part of a culture unless there is a commitment to accountability for progress throughout the school. Principals must adopt and promote a whole-school strategy to enable the school's technological maturity (Timotheou et al., 2023:6711-2). Instructional leadership is crucial in implementing ICT policies in schools, fostering a dynamic educational environment that prepares learners for the digital world (Tunjera, 2019).

3.6 LEADERSHIP ACTIONS RELATED TO SUFFICIENT ICT IMPLEMENTATION

3.6.1 Adaptation of ICT and acceptance of ICT tools in teaching and learning

Leading in the digital space poses unique challenges for leaders, as does adopting ICT for their competency (Larson & DeChurch, 2020:6; Van Wart, Roman, Wang & Liu, 2016:1). According to Khogali and Mekid (2023:3) and Thannimalai and Raman (2018:204), digital economies, robotics, artificial intelligence, and automation will affect the job market significantly. Due to rapid technological advancements, teachers and principals must be flexible and open-minded so that human-related abilities remain relevant. Internet use has changed considerably in education characteristics in developed and developing countries since the mid-1990s (Kimwise, Benjamin & Mugabirwe, 2019:405). Instructional leadership plays a crucial role in promoting the adoption and acceptance of ICT tools in schools, fostering an environment that values creativity and efficient technology use (Yamamoto & Yamaguchi, 2019:52). In addition to personal usage, school leaders need to model technology use to create awareness. A school's leadership needs to understand technology's potential and future evolution to integrate technology into teaching and learning by using computers, consulting professionals, forming technology committees, visiting other schools, and using computers. School ICT development depends on this (Okeke, 2019:53; Almutairi, 2018:96). According to Sarong (2023:870), transformative leaders can create an environment conducive to embracing technological advancements that enhance the educational experience for all stakeholders.

3.6.2 Setting an example

For Damons and Cherrington (2020:11), the school leader must be committed; they must be a champion and custodian of ICT infrastructure and a role model in ICT use. School leaders should lead school transformation through passion, activism and enthusiasm. According to Mikelsone, Grava and Latsone (2023:56) and Soleman (2018:2), the school principal influences changes. School leaders today must actively fill any gaps in their technology knowledge and abilities to drive digital development in their institution and extend this practice to the school learning environment (Hamzah et al., 2021:217). The programmes are more likely to succeed if the principal provides the vision, directs the teachers towards common goals, and drives the resources to

promote change. School principals are critical to the success of the implementation of ICT in schools by stimulating creativity and setting directions for teachers. Both instructional and transformative leadership are instrumental in setting an example when implementing ICT in schools. Such leadership fosters innovation, creates a supportive environment, focuses on learners, uses data-driven decision-making, and promotes continuous improvement (Burić, Parmač Kovačić & Huić, 2021:192).

3.6.3 Empowering staff through professional development programmes for ICT

As an instructional leader, one of the most essential tasks of the principal is to empower staff through professional development activities (DBE, 2016). Teachers are encouraged to incorporate educational technology and improve learner engagement by principals who effectively use it (Wu et al., 2019:1212). Teachers' lack of experience hinders using computers in teaching methods and practices: with more experience, more ICT will be used in the classroom (Mensah & Osman, 2022:118). Through professional development programmes for ICT, instructional leadership empowers staff members, improving teaching methods, learner engagement, cooperation, and achieving favourable results when incorporating technology into educational environments (Omar & Ismail, 2021:16). It is doubtful that ICT will be successfully integrated into education if teachers are hesitant and unaccustomed to including technology in their classes, which was a mistake made originally in incorporating ICTs in education. Therefore, it is crucial to consider teachers' perspectives on technology adoption, not forgetting their successes and challenges (Mensah & Osman, 2022:114). Transformative leadership empowers ICT staff through professional development programmes, promoting continuous learning, innovation, and a supportive environment. This fosters a skilled workforce for success in the evolving ICT field (McCarthy, et al., 2023). According to Uğur and Koç (2019:45), it is essential for school principals and others in leadership roles to understand what constitutes best practices in technology. To effectively implement technology, principals need more customised professional development. Without a solid understanding of technology, principals cannot effectively evaluate how teachers and learners use it for instruction and learning (Uğur & Koç 2019:45).

3.6.4 Supervision of ICT instruction

Saeed and Ain (2022:141) claim that supervision of instruction is another essential facet of instructional leadership. Supervisors include the principal, the school supervisor, and other supervisors. Supervisory duties are part of the principal's duties in schools, and supervision of teachers is one aspect of this. Supervision aims to develop the effectiveness of teachers in carrying out their duties through coaching (Yüksel, Adali, Hamzaoğullari & Sucuoğlu, 2022:68; Griffiths, Shean & Jackson, 2021). Susmadiana, Lian and Puspita (2021) and Haris, Naway, Pulukadang, Takeshita and Ancho (2018:77) define educational supervision as providing services and assistance to improve education. Supervision aims to improve teaching and learning in the classroom and produce quality learning for learners. As stated by Hvidston, McKim and Mette (2016:7), the principal needs to supervise teachers in such a way as to figure out whether they are capable of learning regularly, namely through class visits that allow the principal to observe the learners' learning process directly (Ngole & Mkulu, 2021:61). According to Mustika and Gistituat (2022:587), a supervisory activity can reveal a teacher's strengths and weaknesses in the teaching and learning process, as well as how well they master the competence. Furthermore, the principal's role is to provide solutions, guidance, and follow-ups to teachers so that they can correct existing deficiencies and maintain their superiority. Thus, the principal has a strategic role in improving the quality of education (Mustika et al., 2022:587). As a supervisor, the principal determines what requirements must be met to progress the school. In addition to acting as a learning leader, the principal also manages all leadership functions in the school, including career coaching, coordination, and evaluation (Arafat & Wardiah, 2021:100). ICT adoption in education necessitates instructional supervision for virtual learning environments and new monitoring techniques. This enhances teaching quality, boosts teachers' confidence, and improves learner performance. However, constraints like installation, maintenance, and supervisor training remain a concern (Mapisa & Makena, 2024:215; Danquah, 2018).

3.6.5 Establishing well-resourced ICT venues in schools

A constructive learning environment requires well-trained teachers, well-equipped classrooms, and innovative use of technology in 21st-century schools (Santos & Castro, 2021:2; Umugiraneza et al., 2018:1). By establishing well-resourced ICT venues in schools, principals as transformative leaders can create an environment that fosters innovation, enhances teaching practices, and prepares learners for success in a technology-driven world (Cupido, 2022). According to Rodríguez-Rodríguez, Rodríguez, Elizondo-Moreno, Heras-González and Gentili (2019:5), a well-resourced ICT classroom consists of computers, scanners, copiers, mobile phones, printers, projectors, and broadcast technologies, including radio and television, as well as software that enhances teaching and learning. Computer networks and internet connections are needed to share and distribute data and information between teachers and learners. In a networked school, sources outside the school network can be used where there is an advantage to this (Rodríguez-Rodríguez et al., 2019). According to Munje and Jita (2020:274), learners are prevented from benefiting from the introduction of ICT tools in the classroom due to a lack of ICT resources.

3.7 SUMMARY OF THE CHAPTER

To address the primary and supporting concerns of the study, this chapter has focused on the literature on the application of ICT in education (cf. 1.3.2). The difficulties in implementing ICT and the principal's role were emphasised through a review of the literature. Moreover, barriers, like resource constraint contexts, teacher barriers, management barriers, and leadership barriers, were discussed in detail. Lastly, leadership approaches addressing contextual challenges and managing conditions to ensure successful ICT implementation were discussed. Aligned with the study's overarching theme, it was judged crucial to dissect the ideas surrounding the obstacles to ICT adoption and the strategies that can be employed to support successful ICT integration in classrooms. There is a widespread belief today that the educational system cannot be streamlined to achieve the common goals of innovative education without ICT infrastructure, acceptance, adoption, and (well) usage (Bariu, 2020:3). According to Buabeng-Andoh (2019:276), it is simple to understand that elements like technical support, availability of ICT-based curriculum materials, training for

educators, network and internet access, and computer access are crucial for ICT implementation in the classroom. In this chapter, the barriers that affect the implementation of ICT were identified and discussed. The role of the principal was also highlighted. Chapter 4 will explain and justify the research methodologies chosen for the study.

CHAPTER 4
THE RESEARCH METHODOLOGY ADOPTED FOR THE THESIS

4.1 INTRODUCTION

The three preceding chapters set the stage for the phenomenon being investigated, namely how principals lead and manage ICT implementation in their schools. The first chapter presented the study's theme and the specifics of the research problem to be investigated. Prior literature on the research problem was discussed in Chapters 2 and 3, and the contextual and theoretical frameworks adopted were outlined. The conceptual framework, presented in schematic and narrative form, provided the framework for the entire research study, providing a focus and a connection to relevant concepts, empirical research, and significant theories (Van der Waldt, 2020; Adom & Hussien, 2018). The theoretical framework served as a foundation or anchor for the literature review and, most importantly, the methods and analysis (Luft et al., 2022:5; Grant & Osloo, 2014:12).

Chapter 4 explains the research methodology employed. It describes how the researcher organised the study according to its objectives and questions. The research methodology includes the research paradigm, the design and the approach selected, and a discussion on the various data collection methods employed. A description of the ethics protocol adopted and the procedures used to guarantee the trustworthiness of the research are then covered.

4.2 NATURE OF THE RESEARCH AND THE RESEARCH PARADIGM

4.2.1 Restatement of the problem and aim of the thesis

Researching the knowledge, perspectives, and practices of school leaders in implementing ICTs in education is a complex task, especially as new ICTs emerge continuously and planning becomes more complicated (Yamamoto & Yamaguchi, 2019:48). It is no longer just a complex and demanding task; it is also an opportunity, a risk, and a requirement. Despite research and reform efforts, teachers often avoid using ICT in teaching and learning practices, suggesting that administrative support is understated and under-supported in integrating ICT, curriculum, and instruction

(Ogegbo, 2024:41). Raman and Thannimala (2019:2) confirm the importance of leadership in ICT implementation, stating that “there is no way that ICT can be integrated into the life of the school without a total commitment over time from the school leadership.” The lack of research on this topic necessitates a thorough investigation, especially given the threat of contextual challenges – especially in quintiles 1, 2, and 3 Free State schools. Therefore, this comparative study examines principals' roles in ICT implementation in two distinct school contexts: quintiles 1 to 3 schools and quintiles 4 and 5 schools.

4.2.2 Defining the concept of research paradigm

A paradigm is a researcher's worldview, which shapes their perception and interpretation of the world and influences how they interpret research data. It reflects their beliefs about their current and future world (Kamal, 2019:1388-1389; Cresswell & Plano Clark, 2018; Kivunja, 2017:26). Yong, Husin and Suzilawati (2023:5857) define a paradigm as a set of four elements: epistemology, ontology, methodology and axiology, each containing fundamental assumptions, beliefs, norms and values. Research study within a specific paradigm guides it by its assumptions, beliefs, norms and values, requiring understanding these terms (Ugwu et al., 2021:117).

4.2.3 Interpretivist paradigm

Interpretivism, rooted in hermeneutics and phenomenology, studies people's actions, ideas and meanings to understand cultures and their interactions, focusing on the significance of character and participation in social and cultural life (Alharahsheh & Pius 2020:42). A paradigm is a set of fundamental beliefs about ultimate principles, defining the worldview, individual place, and relationships. These beliefs are fundamental and must be accepted through faith, without verification (Dean, 2018:3; Aliyu, Singhry, Adamu & Abubakar, 2015:2). A paradigm, according to Park, Konge and Artino (2020:690), is a worldview through which knowledge is filtered, or in other words, a dominant perspective that guides the research process.

Omodan (2022:277) defines interpretivism as a school of thought that emphasises the value of both observation and interpretation in comprehending the social world. Since the researcher lives in the world being studied and its institutions and organisations

are viewed as a constructed social reality, the interpretive paradigm recognises that truth is subjective (Pervin & Mokhtar, 2022:422). Pervin and Mokhtar (2022:423) and Ngozwana (2018:20) claim that social science uses the interpretative paradigm – which interprets the subjective meanings ascribed to actions in various social worlds – to understand how people interpret their surroundings. According to Alharahsheh and Pius (2020:42), the most popular type of qualitative research, interpretive research, assumes that reality is socially constructed and that there isn't a single, apparent reality. According to German philosopher Wilhelm Dilthey, interpretive researchers see qualitative methodology as a moral and ethical choice, considering human behaviour as a "text" and reality as interconnected through societal, cultural and ideological categories (Erciyes, 2020:186; Denzin & Lincoln, 2018). The interpretivist paradigm emphasises rich, subjective data, small samples, generalising theories, natural location, low reliability, high validity, and generalisation across settings (Junjie & Yingxin, 2022:11).

Interpretivism, as a social research approach, suggests that natural science methods are unsuitable for social investigation due to the lack of law-like properties in the social world. This study investigates the role of principals in ICT implementation, utilising qualitative research methods (Alhazmi & Kaufmann 2022). Al-Ababneh (2020:80) claims that this paradigm examines how individuals create and reassemble meaning through routine interactions. Human interaction patterns and how people interpret events, circumstances, and other things are emphasised.

The use of the interpretive paradigm in this study – which focuses on the roles of principals in ICT implementation – is appropriate because it enabled the researcher to understand the dynamics that influence principals' leadership and management decisions and actions related to ICT implementation. It allowed for a deeper understanding of the phenomenon that was in line with the paradigm. Secondly, as this study is a comparative study that investigated ICT implementation in different schools' contexts, the interpretive approach allowed the researcher to explore the participants' diverse viewpoints and contextual factors that shaped the roles of principals in ICT implementation. This allowed the researcher to obtain in-depth, qualitative insights.

4.2.4 Epistemological assumptions

Epistemology is a philosophical approach to understanding and clarifying our knowledge, focusing on determining the types of knowledge that are adequate and legitimate (Sol & Heng, 2024:81). According to some researchers, epistemology is a theory of knowledge construction that relies on the researcher's perspective, interpretation, and worldview (Olsson, 2022:43-45; Saldaña, 2011:22). Guraya, Harkin, Yusoff and Guraya (2023:2) and Creswell (2017:20) assert that conducting research in the "field", or the places where participants live and work, is essential because these settings offer critical contexts for comprehending what they are saying. Secules, McCall, Mejia, Beebe, Masters, Sánchez-Peña and Svyantek (2020:20) define epistemology as the study of how we acquire knowledge and understand reality, with crucial debates focusing on effective methods and induction, a bottom-up process.

Qualitative researchers use various epistemological perspectives to co-create knowledge, often working alone or sometimes in groups. They acknowledge the impact of personal, professional, and political commitments on their research (Cruz, Bruhis, Kellam & Jayasuriya, 2021:3; Leavy, 2014:3). The researcher in this study has vast experience as a teacher and coordinator in ICT implementation. This personal and professional experience enabled her to build a profound understanding of ICT implementation challenges and associated dynamics, especially in schools with contextual challenges. Epistemology validates data trust and influences knowledge-seeking in social contexts. Researchers use experience and extensive field time to collect data relevant to relevant social contexts (Ugwu et al., 2021:118). Sol and Heng (2024:84) claim that epistemology is self-evident and that its primary theoretical contribution to research is in the area of theories of knowledge. This study investigated various leadership and management-related theoretical stances, intending to contribute to leadership and management theories and perspectives. In exploring the phenomenon of ICT integration in schools through the actions and decisions of the principals, this study observed the behaviour of principals and teachers to gauge how they understood ICT integration. It also studied their beliefs about what they were doing from their viewpoint.

4.2.5 Ontological assumptions

According to Ugwu et al. (2021:118), ontology is the study of reality, emphasising the essence of existence and the organisation of reality. An epistemologist studies what it means to be known, while the ontologist studies what it means for something to be said to exist (Grass, 2024:44-48). To discern between various categories of objects (real and ideal, concrete and abstract, independent and dependent) and their interrelationships (dependencies, relationships, and predication), ontology prescribes rules (Berryman, 2019). Al-Ababneh (2020) states that concluding the objects within that domain is essential.

According to Ylönen and Aven (2023:583), the ontological assumptions provide an answer to the query, "What is there that can be known?" or, conversely, "What is the nature of reality?" In this study, the aim is to learn the reality of ICT implementation and the role of the principal in this regard. Ontology is a branch of philosophy concerned with the nature of reality and what we know about it (Hathcoat, Meixner & Nicholas, 2019). According to Guala and Hindriks (2023:16), ontology is the theory of existence. It is also the development of strategies to illuminate the mechanisms of social reality for people in terms of what happens, what it looks like, the parts that make it up, and how they interact. In this study, the researcher has constructed viewpoints illuminating the mechanisms of social reality in ICT implementation (that of the experiences of teachers, SMT members, and principals).

The ontological problem concerns the nature of reality and its properties. When conducting qualitative research, researchers embrace the concept of multiple realities. Therefore, the views of teachers, SMT members and the principals were obtained to respond to this quest. Different researchers, the individuals being studied, and the readers of a qualitative study embrace different realities. Qualitative researchers conduct studies on individuals to report on these multiple realities (Cropley, 2023; Creswell, 2017:20).

This study adopted a multiple case study design. In the next section, a comprehensive discussion of the multiple case study design is provided, as well as its application to this particular study.

4.3 THE RESEARCH DESIGN: MULTIPLE CASE STUDY

4.3.1 Definition and purpose

According to Adams, Minton, Hightower and Blount (2022) and Creswell (2017:97), a multiple case study design focuses on real-life, contemporary, and bounded systems (or cases) that are explored over time. This approach involves reporting case descriptions and themes through in-depth data collection from multiple sources of information.

Halkias, Neubert and Harkiolakis (2023) suggest that a multiple case study, or collective case study, allows researchers to analyse similarities and differences across settings, requiring careful selection of cases to predict similar or contrasting outcomes. Multiple-case design is praised for its robust and compelling findings, which are beneficial for understanding complex problems or situations with extensive information (Sibbald, Paciocco, Fournie, Van Asseldonk & Scurr, 2021:292).

4.3.2 Characteristics of the multiple case study design

Multiple case studies can be used to predict either contrasting or similar results in the studies for expected reasons (Diop & Liu, 2020). As a result, the author can determine whether the findings are valuable (Adams et al., 2022). When case studies are compared to one another, the researcher can use the contrasts and similarities to have a significant impact on the literature (Priya, 2021:100). Multiple case studies can be used to "(a) predict similar results (literal replication) or (b) predict contrasting results but for predictable reasons," according to Halkias et al. (2023). Case studies are intended to examine a phenomenon in its entirety. Case studies can cope much better with situations that have multiple variables of interest, numerous sources of evidence, or rich contexts that cannot be controlled or isolated, even though they cannot be used to answer the same precise research questions as, for example, controlled experiments can (Ali Khan, Raman, Sambamoorthy & Prashanth, 2023).

4.3.3 Advantages

Amaral (2022) suggests using multiple case studies to analyse data across different situations, identifying similarities and differences, and assessing the usefulness of

findings, thereby enhancing the exploration of theoretical evolution and research questions. Multiple case studies provide solid and reliable empirical evidence, making their suggestions more convincing and establishing a universal truth (Quintão & Andrade, 2020:266). In situations where several similar cases can provide pathways for replication and comparison, multiple-case design may be useful (Priya, 2021:100). Rashid, Rashid, Warraich, Sabir and Waseem (2019:2) define it as "a technique that connects several pieces of information from the same case to a theoretical proposition, thus improving the rigour of findings and the generalizability of theory."

Other advantages of case studies (including multiple case studies), according to Amaral (2020), are that they have the following advantages over controlled experiments for specific questions: (a) high construct validity, (b) solid procedures for fostering new hypotheses, (c) reasoning about causal mechanisms in individual cases, and (d) capacity to address causal complexity. Adams et al. (2022) suggest that multiple case studies offer a comprehensive understanding of a phenomenon, utilising numerous evidence sources and capturing the evolving aspects of organisational life, enabling generalisation and replication.

4.3.4 Limitations of the multiple case study design

Glette and Wiig (2022:1389) believe that the researcher should keep in mind that creating a multiple case study can be expensive and time-consuming. The analysis elements must be chosen to vary the properties the study will compare. Cases are frequently chosen based on their availability, with little regard for moderator factors (Priya, 2021:100). Takahashi (2020:108) points out that the more case studies a scientific article has, the more confident it is in its representativeness, but the fewer observation time the researcher has spent studying the cases. Ferreira, Andrade and Almeida (2020:276) highlight case selection bias as a significant challenge in multiple-case studies, where cases are often chosen based on availability without considering moderator factors.

In addressing issues about the expense and the amount of time needed, the researcher was fortunate that the schools selected were easily accessible and within a radius of 25 km. To counter issues relating to spending enough time at the different schools, the researcher planned and organised with the schools to spend sufficient

time at the research sites until data saturation was reached. Cases were not based only on availability but adhered to the main criterion: schools from quintiles 1-3 and 4-5 were selected. This ensured that there were no issues with the level of comparability, thus guaranteeing the study's trustworthiness.

4.3.5 Application of the multiple case study design in the study

In studying ICT implementation in schools using a multiple case study design, researchers can select a diverse set of schools representing various demographics, geographical locations, and levels of ICT integration (Khashan, 2019). Data collection methods include interviews with teachers and school principals, observations, analysis of school policies, and examination of learner performance data before and after ICT implementation (Ghavifekr & Ramzy, 2020). By analysing data from these multiple cases, researchers can identify best practices, challenges faced by schools with varying resources, strategies for successful ICT integration, and factors influencing the effectiveness of technology use in education (Almaiah, Al-Khasawneh & Althunibat, 2020: 5277). The findings from such a study can inform policymakers, educators, and stakeholders on how to optimise ICT implementation in schools for improved learning outcomes (Schildkamp, 2019:270).

Therefore, In this study, the researcher aimed to investigate how the principal's role is being defined in ICT implementation, especially in leadership and management approaches. This allowed her to achieve one of the essential aims of multiple case studies, which is, according to Von Coombs (2022), the researcher gain a holistic view of a phenomenon of events to provide a round picture because many sources of evidence were used.

Next, the research approach adopted for the study will be elucidated.

4.4 THE RESEARCH APPROACH: QUALITATIVE RESEARCH

4.4.1 Definition and purpose of qualitative research

According to Aspers and Corte's (2019:142) study aimed at determining how people perceive their world and experiences are typically qualitative. Ugwu and Eze (2023:20) state that qualitative research seeks to understand social concepts and analyse the

participants' perceptions, experiences, thoughts, and actions. According to Busetto, Wick and Gumbinger (2020:2), qualitative research is also used to investigate and comprehend how individuals or groups of people interpret problems (both social and human problems). According to Pilcher and Cortazzi (2024:2369), qualitative research follows a constructivist worldview, in which there is no single reality for a given phenomenon but instead multiple, relative dimensions of reality that can only partially be captured using subjective, naturalistic methods.

According to Kamal (2019:1387), qualitative research is an activity that situates the observer in the world. Qualitative researchers study phenomena in their natural settings, attempting to make sense of or interpret phenomena based on the meanings people assign to them. Qualitative research focuses on the qualities of entities, processes, and meanings that are not tested or measured experimentally. According to Pilcher and Cortazzi (2024:2359), qualitative research is defined by its goals related to understanding some aspect of social life and its methods, which generate words rather than numbers as data for analysis. For these authors, the understanding, explaining, exploring, discovering, and clarifying of situations, feelings, perceptions, attitudes, values, beliefs, and experiences of a group of people is the primary goal of qualitative research. The study design primarily requires selecting people from whom information is gathered and explored in an open inquiry frame. Most qualitative designs are not as structured and sequential as quantitative designs because the parameters of a study's scope, as well as information-gathering methods and processes, are often flexible and evolving (Taherdoost, 2021:11; Eckerdal & Hagstrom, 2017:1). According to Ugwu and Eze (2023:20) and Fetters, Curry and Creswell (2013), qualitative research methodologies are used to investigate why or how a phenomenon occurs, to develop a theory, or to describe the nature of an individual's experience.

One of the most distinguishing characteristics of qualitative research is adherence to the concept of respondent concordance, which requires you as a researcher to make every effort to obtain agreement from your respondents on your interpretation, presentation, experiences, perceptions, and conclusions (Busetto et al. 2020:2). As Cohen (2019:560) proposes, the role of principals in ICT implementation will be investigated using qualitative data.

4.4.2 Characteristics

Ugwu and Eze (2023:20) emphasise five critical characteristics of qualitative research: it occurs in natural settings, is descriptive, focuses on processes, investigates data inductively, and the primary concern is meaning rather than outcomes or products. Ramanadhan, Revette, Lee and Aveling (2021) identify the following four characteristics of qualitative research: the primary goal is process, understanding, and meaning; the researcher is the primary instrument of data collection and analysis; the method is inductive; and the product is richly descriptive. Johnson, Adkins and Chauvin (2020) and Creswell (2017:16) highlight the significant characteristics of qualitative research as including investigating a problem, setting research questions, justifying the problem, gathering data from a small group, using text analysis, and creating a report that incorporates the researcher's subjective reflexivity and bias, as well as flexible structures and evaluative criteria. According to Tenny and Brannan (2024), qualitative research focuses on how people perceive reality: it considers complexity, studies behaviour in natural settings, uses experiential data, describes and interprets concepts, and uses a flexible, systematic process, incorporating real-world context and involving people's accounts. The inductive approaches to knowledge building aim to create meaning and characterise quality research. This is the approach that researchers are using to explore, research and learn about social phenomena robustly to uncover what meanings people ascribe to activities, circumstances, events and artefacts (Cloutier & Ravasi, 2021; Leavy, 2017:9). Good qualitative research needs purpose, competence and concentration, and the task will quickly become onerous unless one recognises this and one’s aims have been clearly defined and committed (Ugwu & Eze, 2023:33). These characteristics of the quality research approach made it the most suitable method to investigate the role of ICT implementation in schools. Mwita (2022) and Kabir (2016) claim that qualitative research methods are open-ended, less structured, and heavily reliant on interactive interviews. They use triangulation to increase credibility and are not generalizable to specific populations. Data collection in qualitative studies takes time and adheres to ethical principles. Common methods include in-depth interviews, observation methods, and document reviews. These methods are not generalisable to any specific population and require thorough, accurate, and systematically recorded data.

4.4.3 Strengths of the qualitative research approach

Qualitative research offers complex descriptions of people's experiences, revealing their contradictory actions, beliefs, opinions, emotions, and relationships. It also identifies intangible factors like social norms, socioeconomic status, gender roles, ethnicity, and religion (Cropley, 2023). Qualitative research simplifies and manages data without destroying complexity, making it suitable for questions where pre-emptive reduction prevents discovery and aims to generate new ways of seeing existing data (Tenny & Brannan, 2024). Ugwu and Eze (2023:33) highlight the advantages of qualitative research, including its holistic and sustainable nature, focus on lived experiences, local significance, interpretation of quantitative data, preservation of time flow, celebration of representations in research, and the possibility of multiple interpretations, including theoretical, moral, or practical ones.

4.4.4 Disadvantages

Hennink and Kaiser (2022) identify the following as qualitative research disadvantages. There are small samples and not necessarily representative of the wider public, so it isn't easy to know how far results are to be generalised. According to Abuhamda, Ismail and Bharat (2021:78-79), quality analysis focuses on detailed descriptions of linguistic features, avoiding classifications. Qualitative approaches to corpus analysis have limitations as they cannot extend findings to broader populations without statistical significance testing.

4.4.5 Application of the qualitative approach in the study

According to various research methodologists such as Cropley (2024), Babbie and Mouton (2001) and McMillan and Schumacher (2010), qualitative research examines how and why things happen. It uses different methods, such as interviews and open-ended questionnaires, to learn how people build their social worlds. In this study, various methods were investigated to understand ICT implementation. Qualitative research also provides clear and detailed explanations of actions and interpretations. It highlights the study procedure and not only the study outcome. The researcher, in the case of this study, provides detailed explanations of the role that principals play in ICT implementation. Qualitative research has a wide range of data collection

combinations and techniques. In this regard, the researcher used collection methods such as interviews, document analysis, and observations to collect data and address the problem. A qualitative approach allows for more flexibility and less structured reporting than quantitative reports. The researcher regarded the qualitative research approach as the best way to achieve the objectives of this study. This should assist in gaining an understanding of the role of principals in ICT implementation in schools.

4.5 DESCRIPTIVE APPROACH

This study also utilised a descriptive approach. Combining these two designs aimed to gather in-depth qualitative data from the multiple case studies and comprehensive descriptive data. Through this approach, the researcher enhanced the overall understanding of the research topic.

4.5.1 Definition

A descriptive case study was selected to respond to the research questions in the first chapter. Descriptive research is a method that describes the characteristics of a population or phenomenon, focusing on the "what" rather than the "why" of the subject, explaining the nature of a demographic segment (Manjunatha, 2019:863). According to Siedlecki (2020) and Nassaji (2015:129), descriptive research describes a phenomenon and its characteristics. This research focuses more on what happened than on how or why. Aggarwal and Ranganathan (2019:34) state that a descriptive approach systematically describes a situation, problem, phenomenon, service, or programme or provides information or describes attitudes towards, say, the conditions of a community's life (Aggarwal & Ranganathan, 2019:34).

4.5.2 Purpose

As its objective, descriptive research mainly intends to explain the set of circumstances as such. This type of research was developed in various fields or subjects using the term *ex post facto* research. This method is mainly used because scientists have no direct control over the variables; they can only report what happens or has happened (Asenahabi, 2019). Descriptive research aims to describe a

phenomenon and its features. As previously mentioned, this research is more about what has happened than how or why it happens (Manjunatha, 2019:864; Nassaji, 2015:129). Descriptive investigation responds to questions like what, who, where and how. The current situation is being examined. This is commonly used in natural and physical science. In social science, however, it is used more commonly, such as in socio-economic surveys and analysis of work and activities (Aggarwal & Ranganathan, 2019:34).

4.5.3 Characteristics

According to Hunter, McCallum and Howes (2019) and Walliman (2011:10), descriptive studies depend on observational data collection; situations are examined to determine what is standard, i.e., under similar circumstances, what could be expected to occur again. Observing may take numerous forms: interviews, surveys, visuals, etc. Hennink, Hutter and Bailey (2020) suggest that while qualitative methods accurately describe populations, situations, and phenomena, they often lack a clear understanding of why they exist. As highlighted by Siedlecki (2020), descriptive research focuses on accurate registration and objectiveness, forming inventories through normative research. According to Manjunatha (2019:826), descriptive research is a quantitative method that uses observational techniques to study uncontrolled variables in a population sample, providing data for future research.

4.5.4 Advantages/Strengths of the descriptive design

Descriptive research offers valuable insights into various topics, mainly qualitatively collected studies, providing unprecedented information and the ability to generate new questions or hypotheses regarding cause-and-effect relationships, according to Manjunatha (2019:866) and Sumeracki (2018). Descriptive research, utilising methods like observation, case study, and survey, provides comprehensive, qualitative, and quantitative data on a topic, ensuring high-quality, honest information and is quick and cost-effective (Manjunatha, 2019:866).

4.5.5 Weaknesses of the descriptive design

Taherdoost (2022:55) and Akhtar (2016:77) identify limitations of descriptive research, including its creative nature, reliance on statistical techniques, the need for precise and accurate descriptions based on scientific findings, and a low internal validity requirement due to its reliance on statistical techniques. According to Manjunatha (2019:866), descriptive research has several disadvantages, including possible lack of confidentiality, potential bias, sample non-representation, and limited scope to learn cause. Personality may lead to untruthful responses, while a halo effect may invalidate observations due to possible bias. The randomness of the sample makes it difficult to validate its representation of the entire population.

4.5.6 Application of the descriptive approach in the study

Aligned with the criteria for the classification of comparative research as proposed by Asenahabi (2019:77), this study adopted a descriptive design. The nature of ICT implementation was described by providing a general overview and detailed descriptions. This may include principals' and teachers' knowledge and attitudes about implementing ICT and their perceptions about the benefits of implementing ICT and strategies.

4.6 SELECTION OF THE PARTICIPANTS

4.6.1 Participant selection strategy

Deliberate sampling is crucial in qualitative research to identify and recruit participants based on research purposes and issues, ensuring that the best-case studies generate the best information (Fischer & Guzel, 2023). The participants in this study were purposefully selected. A purposeful sample that allowed the researcher to select participants based on specific criteria was used according to the qualitative method. The chosen participants included people with characteristics or experiences who helped to understand the phenomenon under study better (Subedi, 2021:2; Hennink et al., 2020). In this case, the participants were the principals, deputy principals, departmental heads, and teachers of the nine schools that were all involved in ICT implementation. Although the study was about the role of the principals, the other

participants mentioned provided valuable perspectives on how ICT implementation took place.

4.6.2 The research sites

The research population was selected purposefully from ten primary schools in the Motheo and Xhariep districts in the Free State. Five quintiles 1-3 schools and five quintiles 4-5 schools were selected because these schools enabled the researcher to compare ICT implementation in different contexts. Eventually, only four quintile 4-5 schools participated in the study. Furthermore, the selection was based on the premise that these schools had ICT teaching and learning resources.

4.6.3 Population

The population in this study consisted of principals, deputy principals, HODs, and teachers from schools in the Motheo district and Xhariep district of the Free State province. The study sample's participants were nine (9) principals and fifty-six (56) teachers. Participants were recruited through telephone calls, personal visits to schools and e-mails. Availability was confirmed through this approach. To ensure a representative sample, the researcher avoided bias and approached five schools in quintiles 1-3 and four schools in quintiles 4-5 to ensure that the sample was large enough. The study was conducted at nine primary schools and combined schools in the Mangaung district and Xhariep district of the Free State Department of Education (FSDoE) and can be regarded as representative. The quintiles 1-3 schools are characterised by low-income neighbourhoods suffering from severe poverty. This area is suspected to have a high unemployment rate, while well-organised schools in affluent suburbs characterise quintiles 4-5.

The population from which the participants were selected comprised principals, deputy principals, HODs and teachers. The following inclusion criteria were used to select the participants:

- Participants who are appointed as principals are responsible for the implementation of ICT.

- Deputy principals and HODS were selected because they form part of the SMT, and technology implementation requires collaboration amongst SMTs and delegation of responsibilities by principals.
- Teachers who use ICT in their classrooms.
- Willingness and availability to participate in the study.

Nine principals and all SMTs (at least one deputy principal and one HOD) at each school formed part of the study. The researcher managed to recruit fifty-six (56) teachers. The study included primary schools because the primary goal was to compare ICT implementation according to the quintile status of the various educational institutions. There were sixty-five (65) participants in all. The following are the reasons why the researcher selected primary schools:

- Their learners' younger developmental stage influences primary schools' selection, necessitating principals to understand and cater to their specific needs for effective ICT implementation (Mpiti & Makena, 2022).
- Primary education principals prioritise building foundational skills, such as literacy and numeracy, alongside ICT competencies, which can be analysed to understand their decision-making processes and instructional priorities (Villamor & Arante, 2022:111).
- Primary school principals facilitate teacher professional development to enhance ICT skills and pedagogical practices, fostering a culture of continuous learning and effective leadership (Cancelliere, Ramsaroop & Petersen, 2023).
- Primary schools' resource allocation priorities differ from those of secondary schools, potentially affecting the availability of ICT tools (Hart, 2023).

By examining factors such as developmental stages, foundational skills, parental involvement, teacher preparation, and resource allocation, researchers can gain valuable insights into effective leadership strategies for integrating technology in primary education settings. ICT education should start from primary school. Primary school technology comes in various forms (Haleem et al., 2022:276).

Starting with the demographic information, twenty-three (23) participants were between 36 and 50, while twenty (20) were between the ages of 51 and 65. There were three male and two female principals; forty-five of the fifty-six teacher who participated in the focus group interviews were female, while eleven were male. In

terms of years of experience as a principal, only three principals in the study had more than ten years of experience. Three principals had more than five years of experience, while three had less than five years of experience. Seven (7) out of the nine (9) school principals (78%) had more than five years of teaching experience with ICT.

4.7 ETHICAL CONSIDERATIONS

When performing research, ethical issues are significant. Rana and Dilshad (2021:4) state that the researcher must humbly comprehend, consider, and approach their task. It should be done with rigour, and specific steps form part of this process, as outlined below.

4.7.1 Obtaining permission from relevant authorities to conduct the research

Trustworthy research not only involves participants' responsibility but also follows ethical measures. Ethics is a set of moral principles that ensures the correct behaviour (Niil, Laryeafio & Ogbewe, 2023:98). The study was authorised by both the University of the Free State Ethics Committee (ethics number: UFS-HSD2021/1009/21) (Appendix B) and the FSDoE (Appendix C). All participants received permission letters from the department and ethical letters when the researcher approached the schools. They were informed beforehand that the interviews would be conducted outside of the regular school hours and that schools would, as far as possible, not be interrupted.

4.7.2 Consent and voluntary participation

Kang and Hwang (2023) suggest that participation should be voluntary and that all information should be anonymously collected to ensure the confidentiality of the study. Millum and Bromwich (2021:1) define informed consent as participants' knowledge-based agreement to partake in an activity of their choice, free from any element of unfair inducement or manipulation, fraud, deceit, or duress. All participants were asked to give informed consent. Consent should be obtained as follows: consent should be given freely (volunteered), subjects should understand what they are asked to do, and persons concerned should be competent to consent. This implies that for a participant to participate in a research study, they must be provided with sufficient research

information, comprehend the information, and have freedom of choice. The participants only agreed to participate in this research after being fully informed about the procedure.

4.7.3 Anonymity and confidentiality

Anonymous means that the respondents' ethnic/cultural background is not identified, their names do not refer to them, and no sensitive information about any participant is revealed (Itzik & Walsh, 2023:705). Bos (2020) and Akaranga and Makau (2016:5) mandate that researchers pledge to protect confidential data, ensure sensitivity and refrain from identifying offensive names or information. Kang and Hwang (2023) emphasise the significance of maintaining participant anonymity and providing insurance to prevent self-identifying statements and data use, thereby protecting them from potential harm. To alleviate the participants' concerns, the researcher, in this case, reiterated the importance of privacy regarding sensitive data, described the study's goal, and described how the data would be utilised. The participants' and the schools' identities were concealed by employing codes.

4.8 DATA COLLECTION METHOD

The researcher was guided by the literature reviewed to prepare, structure and conduct the special individual interviews with the principals, the focus group interviews with the teachers, the document analysis and observation to explore the main principles, perspectives, and practices of ICT implementation in the educational and learning environment of the school system.

4.8.1 Qualitative data collection methods

The survey questionnaire, group and individual interviews, observations, and searches of literature are all forms of collecting data for qualitative research. The data collection techniques used for this study included semi-structured individual interviews (Appendix F), focus group interviews (Appendix G), observation sheets (Appendix I) and documentary analysis (Appendix H). These methods will be discussed in the following paragraphs.

4.8.1.1 Semi-structured interviews

A structured interview follows a specific sequence of questions, like an interview schedule. This method ensures uniform data comparability and requires less talent than unstructured interviews, making it a more effective data collection tool (Taherdoost, 2021:18). According to Ruslin, Mashuri, Rasak, Alhabsyi and Syam, 2022:24), a semi-structured-interview-is a formal conversation with a purpose, involving an interviewer and respondents. The interviewer creates an interview guide with open-ended questions, defining the topic but allowing for detailed discussion. The guide may include prompts; the interviewer can stray from it as needed.

Interviews are best used if the interviewer needs to examine critical comments, design requirements and other insights more closely (Bearman, 2019:4). The semi-structured approach enables the participants to speak about what is of interest or importance in the interview process. It allows flexibility (Elhami & Khoshnevisan, 2022:2). New concepts and information relevant to the study can emerge during the exchange of information. The interviewer can then ask the interviewee to clarify or broaden these aspects (Taherdoost, 2021:18; Brink, 2018:229).

The relevant benefits of individual interviews are listed by Taherdoost, 2021:18). These interviews make it possible to explore matters in a friendly and reciprocal manner and to clarify specific responses when needed. Conversations can give people more information about their feelings about particular issues. One can also obtain more information in greater detail. According to Megaldi and Berler (2020), guided by a general topic, the semi-structured interview allows researchers to explore deep insights despite the provided topical trajectories. Semi-structured interviews involve one-to-one interactions, extensive group interviews, or focus groups, taking place face-to-face, over the telephone, or via various platforms. They have an informal style, a thematic approach, and a fluid structure, allowing for knowledge reconstruction rather than excavation (Ruslin, et al., 2022:29).

According to Ruslin et al. (2022:24), a semi-structured interview is a powerful tool for qualitative research, allowing researchers to obtain in-depth information from informants. It is flexible, adaptable, and maintains its direction, unlike unstructured interviews that may not be carefully guided. Busetto et al. (2020:3) highlight the advantages of semi-structured interviews, including in-depth information gathering,

supplementation from non-verbal reactions, explanation of questions, and extensive interview requests.

Ruslin, et al. (2022:29) highlight that semi-structured interviews are time-efficient and cost-effective and that data quality may be influenced by interaction quality, interviewer quality, and researcher preference. However, these may vary with multiple interviews. Adeoye-Olatunde and Olenik (2021:1362) agree that semi-structured interviews are labour-intensive, requiring interviewer expertise. He emphasises that they may not yield precision unless a small group is involved, with focus groups being more efficient.

Semi-structured individual interviews were conducted with school principals to gather data on ICT implementation despite the time-consuming nature of the method, as they were expected to be critical drivers (Rashid et al., 2019). The questions focused on their role as ICT leaders and managers, contextual issues, and how they supported teachers.

4.8.1.2 Focus group interviews

An interview with a group is a conversation with a group. Informal, spontaneous chats with groups may be included as you wait for services or a social event (Swain & King, 2022:1). Akyıldız and Ahmed (2021:6) explain that the focus groups are a qualitative research strategy where attitudes, opinions, or concepts are explored through open discussion between group members and researchers and are used in various professional and academic areas for information gathering. Focus groups are a quality research strategy that facilitates open discussions between group members and researchers, allowing for exploring attitudes, opinions, and perceptions (Kumar, 2022; Gundumogula & Gundumogula, 2020:299). A group interview consists of six to ten people who collectively discuss a topic previously selected by the researcher (Gundumogula & Gundumogula, 2020:299; Edwards & Holland, 2013:36).

Focus group interviews help identify common experiences, problem solutions, development strategies, and future guidelines for social and urban planning by exploring a group of people with similar experiences (Adler, Salanterä & Zumstein-Shaha, 2019:2). The researcher suggests that broad discussions, either by the researcher or by the group, are developed in advance for focus group interviews and provide an extensive framework for subsequent discussions. As part of the discussion,

the specific discussion points emerge. Focus group members express their views during the debate on these issues (Hadi & Junaidi, 2021:185).

An investigator chooses a group of individuals, ranging from highly trained professionals to average community residents, to discuss a research objective. The group size is crucial for the scope and quality of discussions (Kumar, 2022; Hadi & Junaidi, 2021:185). As mentioned above, a group interview consists of six to ten people participating in a collective discussion on a previously selected topic (Gundumogula & Gundumogula, 2020:299; Edwards & Holland, 2013:36).

One benefit of group information is that you have access to how people speak with each other (Prosser, Heung, Blackwood, O'Neill, Bolderdijk & Kurz, 2024:3). Busetto et al. (2020:3) explain that interviews in the focus group enable researchers to observe participants' facial and corporal expressions. The participants may briefly provide researchers with a wealth of information. According to Akyıldız and Ahmed (2021:9), focus group interviews enable participants to contribute ideas and remarks, aiming for high-quality information in a respectful social context, without expressing agreement or disagreement, enhancing overall understanding.

In general, these focus group interviews require participants to leave their workplaces for the exercise of data collection, so it is an adequate time- and information-producing method (Gundumogula & Gundumogula, 2020:299).

The most critical strategy for answering the "how" kind of research question was a one-hour focus group interview. According to Dewi (2021:30-31), this approach is an information-gathering procedure involving the researcher conducting one-on-one interviews with a group of participants, usually four to six people. Focusing group interviews were conducted with ICT coordinators and teachers concerning the use of ICT and what kind of challenges they have in implementing ICT.

4.8.1.3 Observation

One way to gather primary data is through observation. Kumar (2022:1) explains that observation is a systematic method for collecting primary data, especially when complete or accurate data is unavailable through questioning or when respondents are too involved. Qualitative observations provide insights into actual behaviour in a

specific setting, either participant or non-participant, where the observer is part of the observed setting (Busetto et al., 2020:3).

Uwamusi and Ajisebiyawo (2023:21) emphasise the observer-as-participant approach, allowing researchers to understand participants' assumptions, values, and beliefs while observing behaviour patterns. This approach will enable researchers to socialise and enculturate the context, leading to the phenomena examined. Observations aid in identifying relationships, understanding social settings, understanding interactions, priorities, importance, and participant knowledge. They also help ask appropriate questions and determine the best research questions (Busetto et al., 2020:3; Kawulich, 2012).

The researcher observes the participants without taking part in the same work. The level of participation of the researcher can occur in practice in a continuum, from non-participatory to fully participatory (Kumar, 2022:2-3). The researcher can watch, observe, and record the activities as an observer. Conclusions can be drawn after making several observations. Observation research can be qualitative or quantitative, with practical observations often difficult to find. Qualitative observation generates inferences or hypotheses, while quantitative observations collect inferences and hypotheses and observe dozens to hundreds of people to confirm or disprove them (Goldkuhl, 2019).

Spending time in groups or situations provides rich, accurate information (Kumar, 2022:10). This observation method is direct, reliable, and precise, collecting information in natural environments. It is suitable for situations where people cannot express themselves meaningfully, such as studies about children or animals. It is easy to observe in disguise, collecting data when respondents are unwilling to cooperate and can analyse emotional reactions and contextual background (Kumar, 2022:10; Tight, 2022). According to Goldkuhl (2019), observation is a widely used method in all sciences, offering universality, direct observation, and data collection, without relying on people’s willingness or ability to provide information.

Kumar (2022:10) highlights the challenges of observation as a data collection method, mentioning possible individual or group behaviour change, observer bias, differing interpretations, incomplete monitoring, and missing interaction while taking detailed notes. Lofland et al. (2022) claim that observational data collection is susceptible to

observer bias. The Hawthorne Effect (in which people modify their behaviour because of their awareness of being observed) is time-consuming and expensive and fails to explain why people behave as they do. This method is unsuitable for studying past events or opinions due to its limitations, such as instability, difficulty in observing under unstable conditions, and the inability to quantify collected data. It also faces challenges in studying internal attitudes and opinions, limited sample sizes and being slow, time-consuming, and expensive. Additionally, the observer's ability, consistency, knowledge, bias, and familiarity can influence the collected data (Kumar, 2022:30).

Using this method of gathering data, the researcher investigates the study subject without actively participating in the situation under scrutiny (Tight, 2022:152; Lochmiller & Lester, 2017:153). For this study, the researcher used an observation sheet to record the school's ICT equipment and determine whether it was in use.

4.8.1.4 Document analysis

Document analysis is a systematic method for reviewing and evaluating both printed and electronic materials to elicit meaning, gain understanding, and develop empirical knowledge (Morgan, 2022:64; Bowen, 2009:27; Denzin, 2017:48). Document study is a qualitative research method that involves reviewing written materials like archives, reports, letters and policy documents (Busetto et al., 2020:3).

Document analysis is one qualitative research technique combined with other techniques for triangulation. This entails using various evidence sources, including observations, interviews, and tangible artefacts. Researchers can minimise potential biases and preserve credibility by analysing data gathered from numerous sources, avoiding the charge that a study's conclusions are exclusively attributable to one method or source (Özkan, 2023:824; Bowen, 2009:29). In interpretive epistemology studies, document analysis is frequently used in conjunction with interviews or participant observation as a secondary data collection method to increase rigour through multi-method triangulation (Morgan, 2022:64).

Skimming, reading, interpreting, and combining content and thematic analysis are all steps in the iterative process of document analysis, which groups data into categories based on research questions (Taylor, Garner, Oliver & Desmond, 2024; Bowen, 2009:32). With this approach, a variety of documents are analysed, such as books,

newspaper articles, academic journal articles, institutional reports, and books. A text-based document can serve as a source for qualitative analysis (Morgan, 2022:65). It is cost-effective and accessible for small-scale projects. Analysing organisational policy documents is a leadership tool that enhances policy implementation, integrity and credibility (Sonmez Cakir & Adiguzel, 2020).

By doing a document analysis, researchers can gather data that would otherwise take a lot of time and effort to collect (Morgan, 2022:67). Document analysis is often used as a standalone research method by researchers, providing access to the best data sources, such as books and journal articles, due to their stability (Morgan, 2022:66). Policy document analysis benefits policymakers and administrators, as it helps regularly review and update policies to meet organisational needs, making it practical for educational leaders and administrators (Bullock & Lavis, 2019). Document analysis is a cost-effective and non-reactive qualitative research method that requires data selection rather than collection. It is available in the public domain, suitable for repeated reviews, and offers broad coverage, although it has limitations (Özkan, 2023; Bowen, 2009:31).

Working with sparse data is a drawback of using pre-existing texts. It may not be possible to find data sources on a given topic. Depending on the data at hand, researchers may need to modify their research questions or interests (Sonmez Cakir & Adiguzel, 2020). Dalglish, Khalid and McMahon (2021:1426) highlight drawbacks of document analysis, including biased selectivity, poor retrievability, and insufficient detail, often found in non-research documents that may support organisational agendas or policies. Özkan (2023) states that geographical inaccessibility and inadequate detail in certain documents can hinder research, primarily when relying solely on documentary data sources. Morgan (2022:66) claims that analysing public records and personal documents can lead to potential biases despite their objectivity.

This study also utilised documentary analysis as a data collection method. The researcher investigated the participating schools' policy documents, which were done according to pre-determined criteria on an observation sheet. The principals were requested to provide the researcher with a copy of the school's ICT policy. The objective was to determine whether the school had a policy, what the content of the policy implied, and whether the teachers adhered to it. The ICT Policy was available in four of the nine schools sampled. The ensuing points were examined:

A. Availability of ICT-related policies.

- ICT policy of the schools
- Provincial ICT policy
- National ICT policy

B. Evidence of leadership and management to enhance ICT.

- Professional development
- Vision and mission statements
- Goals
- Minutes of meetings
- ICT strategic plans
- ICT timetables
- Budgets

C. Equipment and resources

- Computer Laboratory
- Number of computers
- Interactive whiteboards
- Printers
- Projectors
- Television (v) digital cameras

D. Other

- Purpose
- The school's aims for ICT implementation
- The school's curriculum organisation
- Curriculum management
- Curriculum enhancement
- Access to ICT
- Inclusion
- Recording, assessment, and reporting
- Monitoring and review
- Health and safety/security
- Copyright and licensing

- Does it provide helpful guidance for the ICT coordinator, headteacher, parents, governors, and staff?

4.9 ENSURING THE TRUSTWORTHINESS OF THE RESEARCH

The trustworthiness of any given study is primarily determined by its validity and reliability, and this researcher, therefore, paid particular attention to these aspects. Kyngäs, Kääriäinen and Elo (2020) propose that research should satisfy four criteria: these are credibility, transferability, dependability, and confirmability (Stahl & King, 2020:26). These criteria will be discussed next.

4.9.1 Credibility

Credibility requires learners to see the research results as authentic and a true account of the study's events (Little & Green, 2021:6; Kumar, 2018:169). Credibility in research studies is ensured through sustained involvement, peer debriefing, member inspections, self-perception monitoring, and using multiple data sources, providing the researcher's internal validity (Adewole, 2022). Rose and Johnson (2020) highlight that credibility in qualitative research refers to participants' believable interpretation of opinions and feelings, with higher results indicating greater validity. Credibility is crucial in studies to accurately reflect participants' social reality, using strategies like long-term involvement and member controls (Ahmed, 2024). In this study, credibility was ensured through the fact that the researcher stayed for long periods at the research sites. The data was also shared with the participants, allowing them to read through it to ensure that the responses reflected their views.

4.9.2 Transferability

Transferability refers to the extent to which qualitative research results can be transferred in other contexts (Stalmeijer, Brown & O'Brien, 2024:2; Anney, 2014:277). Transferability, similar to external validity, enables generalisation of study results to other populations by providing sufficient details about participants and settings, allowing readers to interpret them (Weise, Büchter, Pieper & Mathes, 2020:761; Lapan, 2012:29). The transferable aspect of qualitative research requires a

comprehensive description of the research framework, allowing readers to assess its suitability for their specific circumstances (Snyder, 2019). To ensure transferability, detailed descriptive information has been obtained in this study to facilitate contextual comparisons.

4.9.3 Dependability

Dependability, also called consistency, is based on the repeatability of a study (Stahl & King, 2020:27; Korstjens & Moser, 2017:122). Dependability parallels reliability, which means that the measurements of the variables are consistent. Developing dependability requires the researcher to perform a dependability audit to show the changes in the research process and the understandings related to it (Riazi et al., 2023:5; Lapan, 2012:11). This is very close to the concept of reliability in quantitative research within the framework, "It is a question of whether we will achieve the same results if we can see the same thing twice" (Sürücü & Maslakçı, 2020; Trochim & Donnelly 2007:149). Quality research requires a thorough record of the process for replication, ensuring dependability and detail, and a detailed audit trail for easy replication (Ahmed, 2024; Maher et al., 2018:3). In this study, dependability was ensured by using more than one method to compensate for any possible weakness in using only one method of data collection. An audit trail was ensured by documenting every step of the research process, including the selected design and data collection methods and specific details that ensured transparency and replicability.

4.9.4 Confirmability

An aspect of neutrality is confirmability. The intersubjectivity of the data needs to be secured. It should not be based on one’s preferences and views but must be based on the data. The focus here is on the process of interpretation that is part of the analysis process (Ahmed, 2024; Korstjens & Moser, 2018:122). Confirmability and objectivity parallel the absence of personal prejudice. Confirmability is based on the supply of a chain of information that enables readers to understand the data source and illustrative examples of the data supporting the findings of the researcher (Stahl & King, 2020:27). In this study, confirmability was ensured through the process of triangulation of the data collection methods. Triangulation is comprised of using more

than one data collection method. The researcher tried to provide an objective account of the data and, with the promotor's help, cross-validated the findings of the interviews with the principals and teachers. By maintaining a reflective stance, the researcher minimised biases and assumptions. The researcher triangulated the views of the different participants to establish agreements and differences in ICT implementation. The various data sources also helped the researcher cross-validate how principals perform their leadership and management roles and compare the findings, ensuring the study's trustworthiness.

4.10 DATA ANALYSIS

The criteria used to determine what forms of data analysis are, according to Alem (2020:2), fitness-for-use and legitimacy. The purpose of qualitative data analysis is to ascertain learners' comprehension of a particular phenomenon by examining their attitudes, perceptions, knowledge, values, experiences, and sensations (Ugwu & Eze, 2023:30). In this study, data analysis was used to break the broken-down data (coding) into smaller functional sections to show their distinctive characteristics to give meaning (Linneberg & Korsgaard, 2019:3; Leedy & Omrod, 2005:150). Data was then classified into themes for thematic analysis. All data collected to conduct research must be analysed for the structure of the study. "Analysis involves dividing data into themes, patterns, trends and relationships," state Jowsey, Deng and Weller (2021:475). It involves looking for models in recurring behaviour. Mezmir (2020) comments that "qualitative researchers integrate organizational, analysing and interpreting data operations and call for the complete analysis of process data." In analysing the data, the researcher followed the approach as outlined by Creswell and Poth (2018:48) and Babbie (2008:124). Step one was to organise and prepare the data, followed by the transcription of the interviews (individual and focus group). Data was then coded into categories. After that, codes were described and classified into themes, followed by presentation and analysis of the data. Lastly, the researcher provided conclusions about the discussions.

4.11 SUMMARY OF THE CHAPTER

This chapter has included the research designs, data collection techniques, data analysis procedures, and ethical considerations. The research questions posed in the first chapter were satisfactorily addressed by the research techniques and designs employed in this investigation. This included a description of the data collection techniques and their advantages and disadvantages. This chapter also referred to the steps to guarantee the study's trustworthiness. The next chapter includes the data collected and analysis of the data.

CHAPTER 5
PRESENTATION, DISCUSSION AND ANALYSIS OF THE RESEARCH FINDINGS

5.1 INTRODUCTION

The research design and methodology employed in this study were covered in Chapter 4. Building on Chapter 4, Chapter 5's goal is to present, evaluate and analyse the information gathered from primary school principals and teachers in the Free State's Motheo and Xhariep districts over a year. The primary objective of this research project was to examine the role principals play in integrating ICT into their schools.

Convenience sampling was used to choose participants to respond and offer input during focus group interviews with teachers in Grades 1 through 7 and individual interviews with school principals. The research participants were questioned extensively about their experiences using ICT in the classroom (teachers in Grades 1–7) and about directing and overseeing the adoption of ICT at their schools (principals). Teachers' opinions about the role of principals in ICT deployment were also sought.

Examining the research findings derived from the focus groups, the individual interviews, the observations and the document analysis produced qualitative data that addressed the significant sub-questions of the study. The relevant participants' demographic information is reported in the first section of this chapter. The second section presents the results of the focus group chats and the qualitative individual interviews. The findings are integrated and discussed in the final section. Figure 5.1 outlines the procedures used in this chapter to present and discuss the empirical findings for each initial data-gathering process.

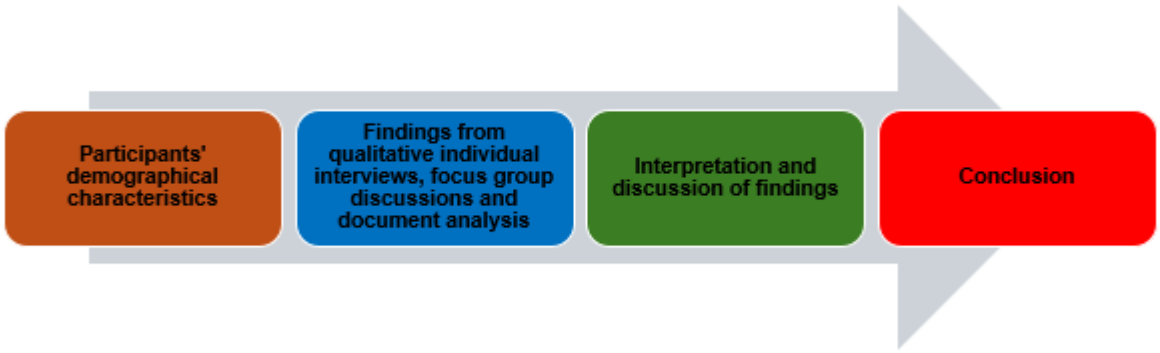

Figure 5.1: Procedures employed to discuss empirical findings

The study's goals and developing themes were considered when presenting the results. Furthermore, the entire set of data is displayed topically. Consequently, managing the substantial data created during this project proved less complicated for the researcher (Taherdoost, 2021:21). The following were the goals of the study:

- To investigate the extent to which barriers hinder the successful implementation of ICT in various school settings.
- To examine the leadership responsibilities and roles of principals in ICT implementation contrasted across different contexts.
- To examine the critical management duties and functions principals perform in implementing ICT in various school environments.
- To suggest strategies principals should use for successful ICT implementation across different school settings.

This comparative study aimed to compare the role of the principal in different quintile settings (quintile 1-3 vs quintile 4-5). Plaatjies (2020), referring to the contextual component, states that all South African government schools follow a quintile system in which they are divided into five groups. This division stems from the widening economic divide in the nation, the problem of socio-economic status, and the differences between wealthy and impoverished educational systems. Schools are categorised as quintiles 1, 2, and 3 for the more economically deprived (poorest) geographic places and quintiles 4 and 5 for the more economically privileged (wealthiest) environmental areas. Thus, for this research study, we consider the background of the schools in terms of being previously privileged or underprivileged,

the participating schools' quintile ratings, their resources and infrastructure, and the demographics of the principals and teachers who took part in the study. Since the study used a multiple case study methodology, data from different institutions were compared to discuss the conclusions. As a result, each case was examined separately to fully understand its distinct qualities, background, and findings. The examples were then contrasted to find commonalities, discrepancies, trends, and motifs among the various cases.

5.2 BACKGROUNDS OF THE PARTICIPATING SCHOOLS

This section describes the background of the participating schools and sketches the settings and contexts in which ICT is being implemented in schools. Understanding context in ICT implementation is crucial, as Khan (2023:22) points out that context is strongly associated with the digital divide. The background information was obtained from observation of the ICT infrastructure. This background information will provide the reader with information on many characteristics of the school, including the type of school, learner enrolment, number of teacher posts, quintile rating, and ICT infrastructure. Thus, the background will highlight the conditions under which school leadership and management are practised and may present barriers to ICT implementation (Van Deventer, 2016:442). All nine schools that participated in this study are situated in the Motheo and Xhariep Education Districts in the Free State province. The profiles of the schools are reflected in Table 5.1. Based on Table 5.1, an in-depth discussion is provided on each aspect related to each school's profile and ICT infrastructure. The background information was obtained from observation of the ICT infrastructure.

Table 5.1: School profile and ICT infrastructure

School				ICT infrastructure (equipment and resources)						
	Quintile ranking	Learner enrolment	Number of teacherposts	Computer Laboratory	Number of computers	Interactive whiteboards	Printers	Projectors	Television sets	Digital cameras
School 1 (S1)	1	448	19	1	70	8	4	1	3	0
School 2 (S2)	1	1792	47	1	67	3	1	2	2	0
School 3 (S3)	2	1211	33	1	40	7	4	5	0	0
School 4 (S4)	2	534	23	1	30	0	2	2	0	0
School 5 (S5)	3	1076	31	1	60	1	3	1	0	0
School 6 (S6)	5	738	30	2	84	0	9	45	2	5
School 7 (S7)	5	547	27	1	36	2	27	27	0	1
School 8 (S8)	5	993	30	2	60	0	30	30	6	4
School 9 (S9)	5	817	40	2	80	6	6	2	30	2

5.2.1 Type of school (quintile)

Schools 2, 3, 5, 6, 7, 8 and 9 are primary schools offering tuition to Grades R to 7. Schools 1 and 4 are combined to provide Grades R to 12 education. For this study, only teachers who taught Grades 1-7 in combined schools were interviewed, as described in the sample size in Chapter 4.

School 1 is a quintile 1 school located in a rural area. Schools 2 and 5 have quintile 2 status and are settled in a low-income neighbourhood. School 3 finds itself in a neighbourhood comprising mixed-income (evidence of low-income and middle-class) housing and is a quintile 2 school. School 4, conversely, is a quintile 2 school in a rural community, characterised by mixed-income housing. All the schools described in this paragraph belong to the low-ranking quintiles (1-3).

Schools 6, 7, 8 and 9 are all quintile 5 schools, nestled in affluent suburbs, in high-income neighbourhoods. Most of the learners in these schools, except for school 9, do not reside in the neighbourhood where the school is located, with most of them coming from high-income neighbourhoods. Parents may send their children to these schools because of the quality of education and because they can afford the school fees.

When comparing the low- and high-ranking quintile schools, it is evident that schools in quintiles 1-3 are situated in low-income neighbourhoods or rural areas, while schools in the quintile 4-5 category are in affluent suburbs with high-income households. The implication is that the schools in the low-income households may struggle with ICT implementation due to the digital divide, which has led to the gap in technology access, resources, ability and knowledge (see Khan, 2023:22).

5.2.2 Learner enrolment

School 2 has a large learner enrolment of 1 792 learners, followed by School 3 with 1211 learners and School 5 with 1076 learners. These three schools fall under quintile 1-3 category schools. Interestingly enough, schools 1 and 4 in the quintile 1-3 category have a smaller learner enrolment. This may be ascribed to the area's population size or the parents' preferences. In comparison, quintile 4-5 schools' learner enrolment is less than 1000 learners each. The data shows that learner enrolment appears to be higher in quintile 1-3 schools. It is evident from the above information that learner enrolment is higher in quintile 1-3 schools, while in quintile 4-5 schools, it is much lower. This may hamper individual support to learners in quintile 1-3 schools. It may also affect resource allocation and challenges with sufficient infrastructure in quintile 1-3 schools.

5.2.3 Number of teacher posts

Table 5.1 also indicates the number of teachers employed at each school. Teacher posts are allocated per school based on the school learner enrolment. The data from quintile 1-3 schools shows that S1 has 19 educators, S2 has 47 educators, S3 has 33, S4 has 23, S5 has 31. The average ratio of learners per teacher is 31 in these schools. The data from quintile 4-5 schools shows that S6 has 30 educators, S7 has 27, S8 has 30 and that 40 teachers are employed at S9, which is an average ratio of 24 learners per educator, which is lower than in the quintile 1-3 schools. Except for the combined schools, the learner-teacher ratio at quintile 1-3 schools is high. Schools in the 4-5 quintiles may have more School Governing Body (SGB)-appointed teachers due to their robust financial position. The School African Schools Act (SASA) has been amended to permit public schools to hire additional educators, provided they raise the

necessary funds (Van Wyk, 2020:49). McHenry-Sorber, Campbell and Sutherland (2023:242) agree, noting that school boards often use school funds to finance additional staff appointments due to the growing need for teachers. However, due to the lack of funds, low-ranking schools may suffer, as they cannot appoint extra teachers to alleviate the workload amongst staff. This factor is an albatross in ICT implementation at quintile 1-3 schools, widening the digital divide.

5.2.4 Comparison of ICT infrastructure in schools concerning quintiles

To allocate financial resources to public schools, the South African government categorised them into five quintiles to address the socioeconomic status and disparity in access to education (Dass & Rinquest, 2017). School socioeconomic status is determined by average income, unemployment rates and literacy levels in the school's geographical area. Quintile 1 schools are classified as being in the most economically disadvantaged (poorest) geographical areas, while quintile 5 schools are classified as being the most economically privileged (wealthiest) (Ogbonnaya & Awuah, 2019). Based on this formula, participating schools 1-5 are considered low quintile schools, while schools 6-9 are regarded as high quintile schools. This study aims to determine how the principals of the different quintile schools use ICT in their circumstances. It was considered necessary to analyse the socio-economic environment of each participating school and its influence on the implementation of ICT. This provided a better picture of how principals fulfil (and should fulfil) their role in different school contexts.

5.2.4.1 Quintile 1-3 schools

School 1 is newly constructed in a rural country town. The neighbourhood is impoverished, with approximately 90% of households receiving government financial assistance. A private company donated a fully equipped computer laboratory to the school as part of a donation of new ICT equipment. A computer laboratory, 70 computers, eight interactive whiteboards, four printers, one data projector, and three television sets are available in the school. The ICT coordinator (a teacher) uses 40 computers in the computer laboratory, while the remaining 30 are stored. Five of the eight interactive whiteboards are being used by teachers. Unfortunately, two

interactive whiteboards do not function; one is in a media centre used by the DBE's e-learning official.

School 2 is in a low-income neighbourhood suffering from severe poverty. It is suspected that this area has a high unemployment rate. A new school building has been constructed, and new equipment has been purchased. A private company has generously donated ICT equipment to the school. The school has a computer laboratory that contains 40 computers that have never been used. In total, 67 computers are present in the schools, which have all been locked away. The teachers have not utilised the eight interactive whiteboards that have been installed. This finding was supported during the focus group interviews, where participants S2/T4 indicated that the school has smartboards (interactive whiteboards) but are not connected and are currently in storage. The administration office only has one printer. In addition, the school has two data projectors and two television sets that are stored.

School 3 is in a neighbourhood with mixed-income housing and is classified as a quintile 2 school. Poverty and low economic status are evident in the neighbourhood. Half of all households receive social grants from the government. In the conversation with the principal of this school, he alluded to this challenge. The school is a newly constructed facility that has recently received ICT equipment from a private company. The school has a computer laboratory with 40 computers that teachers fully utilise. In addition, the school has seven interactive whiteboards, four of which are being used by teachers, while the remaining three are in classrooms where they are not being used. The school has four printers, one used by the teachers and three allocated to the administration. The school also has five data projectors, of which four are in use, and one is in storage.

School 4 is located in a rural community characterised by mixed-income housing. The school has a computer laboratory with 30 computers, but neither teachers nor students use it. This was evident from the observation at the school and interviews with the teachers, as one of them indicated:

> *"I will also say that accessibility to the things that's currently here, if we can have free access, then it's no problem. But now the things are locked up in rooms that you don't have access to and things like that"* (S4/T3).

The DBE provided the computers to the school. In the administration office, two printers are available. In the school, there are two data projectors, one being used by a teacher and the other being in storage.

School 5 is located in a mixed-income neighbourhood and is a quintile 2 school. There is a computer laboratory at the school, but it is not being used, and the computers are outdated. A total of 30 computers are in the computer laboratory, while the remaining 30 are in storage. This was evident from the interviews with the teachers:

> *"Also, what we currently have is a bit outdated. So, I would say from the school's side, if they could maybe update it, get new laptops or programs that we can install, or the hardware to help upgrade what we currently have*" (S5/T1).

The DBE provided computers to the school. The school's computer laboratory has an interactive whiteboard that has not been used. This is evident from the interview of one of the teachers at the school:

> *"They have closed... So, we cannot access the smartboard. Everything is locked up. So, there is no usage at all"* (S5/T2).

The school administration office is equipped with three printers. Based on Table 5.1, it is evident that not all of the schools that participated in this study have sufficient ICT infrastructure. When considering the number of ICT resources available at school 2 with its learner enrolment, the provision of ICT infrastructure in this quintile 1-3 school is insufficient. For example, school 2 has 1792 learners with a computer laboratory, 67 computers, three interactive whiteboards, two data projectors, and two televisions. This was also evident from the response of one of the teachers interviewed.

> *"Even the computers. I feel like the numbers are too small to cater for most of the learners in a class. So, we need more facilities. Another concerning factor is the fact that computers and interactive whiteboards are not utilised at some of the schools. This may be attributed to the fact that principals lack interest and the capacity to ensure implementation. This was also evident from the following remark during the interviews"* (S4/P).
>
> *"I don't have the skills to implement ICT in the school"* (S2/T2).

5.2.4.2 Quintile 4-5 schools

School 6 is a well-organised school located in an affluent suburb. Even though many learners do not live in the neighbourhood where the school is located, they are most likely to come from high-income neighbourhoods. Both teachers and learners use the two computer labs, which contain 84 computers. The school has nine printers available for use by teachers and the administration office. The school has 45 data projectors; each classroom has one that the teachers fully utilise. In addition, the school has two television sets and five digital cameras. The school also has a recording studio. Teachers use this to record lessons for their learners at the school. Based on this information, the infrastructure and usage seem to exceed standards.

School 7 is located in an affluent suburb with many high-income households. The school has one computer laboratory with 36 computers. At the school, each teacher has access to an interactive whiteboard in the classroom, and the school also has 27 data projectors. Additionally, there are printers in every classroom, with 27 printers. A digital camera is also available at the school. This information shows that the infrastructure and ICT usage exceed standards.

School 8 is in an affluent suburb. Two computer labs in the school have a total of 60 computers. Both learners and teachers fully utilise the computer labs. The school provides teachers access to 30 data projectors and 30 printers for classroom use. Additionally, the school has six television sets and four digital cameras. Based on this information, the infrastructure and ICT usage seem to exceed standards.

School 9, like the other schools in the quintile 4-5 group, is in a high-income neighbourhood in an affluent suburb. In two computer labs, 80 computers are available for student and teacher use. School facilities include six interactive whiteboards and six data projectors. They have also equipped all classrooms with intelligent television sets, totalling 30. There are two digital cameras at the school. A digital TV channel has been established as part of the school's communication effort with parents, learners, and other stakeholders. Based on this information, the infrastructure and ICT usage seem to exceed standards.

It is clear from Table 5.1 above that all the schools that participated in this study have ICT infrastructure, even though this may not be sufficient for learner enrolment at some of the schools. For instance, School 2, with 1792 learners, has one computer

laboratory, 67 computers, three interactive whiteboards, two data projectors, and two television sets. This is also evident in the response from one of the teachers interviewed:

> *"Even the computers. I feel like the numbers are too small to cater for most of the learners in a class. So, we need more facilities"* (S2/T2).

Prominently, there is one computer for every 19 learners in quintile 1-3 schools, compared to 1 computer for every ten learners in quintile 4-5 schools. When comparing the data, it is evident that ICT equipment is less in quintile 1-3 schools than in quintile 4-5 schools; for example, in School 6, there are 45 data projectors, which implies that there is a data projector for each teacher in the school because the school has 45 teachers. The same is evident in Schools 7 and 8, while School 9 uses television sets. In the quintile 1-3 schools, however, the case is not the same. School 2 has three interactive whiteboards, one data projector and two televisions for 47 teachers. School 3 has seven interactive whiteboards, four data projectors and five televisions for 33 teachers. It is possible that teachers in quintile 4-5 use ICT in their classrooms because it is available. Another possible reason may be that teachers at these schools are more skilled in ICT use. From a leadership and management perspective, principals may provide better leadership and management support. This is confirmed from the interviews with some principals at quintile 4-5 schools:

> *"I motivate teachers to use it… mean everyone has a computer or a printer. Yeah, and it's available to them any time of the day"* [S1/P].

On the other hand, in quintile 1-3 schools, the implementation of ICT in their classrooms seems lacking because ICT equipment is insufficient. Although there are limitations compared to quintile 4 and 5 schools, there are significant issues with equipment not being used.

Next, the demographical details of the participants will be presented. This detail aims to add to the data's depth, context, and credibility. It also helped interpret and analyse the data across the cases and ensured that ethical protocol was respected.

5.3 DEMOGRAPHICAL DATA OF PARTICIPANTS

At all nine participating schools, individual interviews were conducted with the principals. Focus group discussions were held with teachers of the nine schools, and the number of participants varied from 4 to 7 teachers per school. In total, 56 teachers participated, ensuring the data saturation. Table 5.2 below indicates the participants' demographical information.

Table 5.2: Participants' demographical data

QUINTILE 1-3 SCHOOLS							
	Gender	**Age**	**Years teaching**	**Years as Principal**	**Qualification**	**Formal Qualification in Management**	**Years of teaching with technology**
School 1 (S1)							
Principal (P)	F	36-50	27	15	M+4	Yes	2
Teacher (T1)	M	36-50	14	NA	M+4	NA	8
Teacher (T2)	F	36-50	12	NA	M+3	NA	12
Teacher (T3)	F	36-50	17	NA	ACE	NA	10
Teacher (T4)	M	20-35	1	NA	Post Grad.	NA	1
Teacher (T5)	F	36-50	21	NA	ACE	NA	7
School 2 (S2)							
Principal (P)	M	51-65	29	19	Post Grad.	Yes	2
Teacher (T1)	F	20-35	5	NA	M+3	NA	0
Teacher (T2)	F	36-50	20	NA	M+4	NA	0
Teacher (T3)	F	20-35	4	NA	M+4	NA	4
Teacher (T4)	F	36-50	4	NA	Post Grad.	NA	4
Teacher (T5)	F	51-65	35	NA	Post Grad.	NA	3
Teacher (T6)	F	36-50	15	NA	ACE	NA	0
School 3 (S3)							
Principal (P)	M	51-65	29	5	M+4	No	15
Teacher (T1)	M	20-35	8	NA	M+4	NA	2
Teacher (T2)	F	51-65	30	NA	Post Grad.	NA	8
Teacher (T3)	F	20-35	7	NA	M+4	NA	2
Teacher (T4)	M	20-35	9	NA	M+4	NA	9
Teacher (T5)	M	20-35	7	NA	Post Grad.	NA	3
Teacher (T6)	F	20-35	8	NA	M+4	NA	2
School 4 (S4)							

Principal (P)	M	51-65	27	9	M+4	Yes	10
Teacher (T1)	F	36-50	7	NA	Post Grad.	NA	0
Teacher (T2)	F	51-65	20	NA	M+3	NA	0
Teacher (T3)	M	20-35	11	NA	Post Grad	NA	4
Teacher (T4)	M	20-35	5	NA	Post Grad	NA	0
Teacher (T5)	F	51-65	31	NA	Post Grad	NA	0
Teacher (T6)	F	20-35	12	NA	Post Grad	NA	0
Teacher (T7)	F	36-50	14	NA	Post Grad	NA	0
School 5 (S5)							
Principal (P)	F	36-50	27	1	M+4	Yes	3
Teacher (T1)	M	36-50	14	NA	Post Grad.	NA	10
Teacher (T2)	F	20-35	6	NA	M+4	NA	4
Teacher (T3)	M	36-50	29	NA	M+3	NA	5
Teacher (T4)	F	20-35	2	NA	Post Grad.	NA	1
Teacher (T5)	F	20-35	6	NA	M+4	NA	6
Teacher (T6)	F	51-65	35	NA	Post Grad.	NA	0
QUINTILE 4-5 SCHOOLS							
	Gender	**Age**	**Years teaching**	**Years as Principal**	**Qualification**	**Formal Qualification in Management**	**Years of teaching with technology**
School 6 (S6)							
Principal (P)	F	51-65	42	1	Post Grad.	No	17
Teacher (T1)	F	36-50	12	NA	Post Grad.	NA	8
Teacher (T2)	F	51-65	28	NA	Post Grad.	NA	24
Teacher (T3)	F	36-50	11	NA	Post Grad.	NA	11
Teacher (T4)	F	20-35	4	NA	Post Grad.	NA	4
Teacher (T5)	F	36-50	12	NA	Post Grad.	NA	10
Teacher (T6)	F	51-65	25	NA	Post Grad.	NA	15
Teacher (T7)	F	20-35	11	NA	Post Grad.	NA	8
School 7 (S7)							
Principal (P)	F	51-65	25	15	M+3	No	0
Teacher (T1)	F	20-35	3	NA	Post Grad.	NA	3
Teacher (T2)	F	51-65	33	NA	M+4	NA	10
Teacher (T3)	F	51-65	42	NA	Post Grad.	NA	10
Teacher (T4)	F	36-50	16	NA	ACE	NA	7
Teacher (T5)	F	36-50	15	NA	Post Grad.	NA	10
Teacher (T6)	F	20-35	6	NA	Post Grad.	NA	6
Teacher (T7)	F	51-65	37	NA	Post Grad.	NA	37
School 8 (S8)							

Principal (P)	F	51-65	36	6	M+4	Yes	6
Teacher (T1)	F	51-65	37	NA	M+4	NA	30
Teacher (T2)	F	51-65	34	NA	M+3	NA	30
Teacher (T3)	F	51-65	32	NA	M+4	NA	32
Teacher (T4)	F	51-65	30	NA	M+4	NA	10
Teacher (T5)	F	36-50	15	NA	M+4	NA	6
Teacher (T6)	M	36-50	26	NA	M+4	NA	26
School 9 (S9)							
Principal (P)	M	36-50	28	4	Post Grad.	Yes	8
Teacher (T1)	F	20-35	1	NA	M+4	NA	1
Teacher (T2)	F	36-50	23	NA	M+4	NA	13
Teacher (T3)	F	20-35	12	NA	M+4	NA	12
Teacher (T4)	F	20-35	6	NA	M+4	NA	6
Teacher (T5)	M	36-50	19	NA	M+4	NA	9
Teacher (T6)	F	20-35	5	NA	M+4	NA	5

The participants are identified through an abbreviation as follows:

S5/P: The S stands for the school, the 5 stands for the fifth school, and the P indicates the principal.

S5/T1: The S stands for the school, the 5 stands for the fifth school, the T indicates the teacher, and the 1 indicates the first teacher interviewed.

The following paragraphs summarise the participants' demographical data (Table 5.2).

5.3.1 Gender

Based on the data provided, four of the nine principals who participated in the individual interviews were male, while five were female. When looking at the participants' gender, the data shows that there were three male and two female principals at the so-called low quintile schools. For the quintile 4 and 5 schools, there were four female principals and one male. Forty-five of the fifty-six teachers who participated in the focus group interviews were female, while eleven were male. The data shows that in the quintile 1-3 schools, there were 30% male and 70% female participants, while in the quintile 4-5 schools, there were 25% male principals, with 75% female. The data shows that more female than male teachers participated in this

study. Waghid and Davids (2020:3) highlight that while female teachers in South Africa are more numerous than males, they are underrepresented in leadership positions.

5.3.2 Age

Of the nine principals who participated in the individual interviews, three were between the ages of 36 and 50, and six were between the ages of 51 and 65. There was no participant younger than 36 years of age. Thus, it can be concluded that the participants have experienced teaching over a prolonged period and must have acquired valuable experience dealing with curriculum implementation and school development in general. A survey conducted by the OECD (2019:2) found that, on average, South African principals are 51 years old. When a principal is appointed, they will likely be someone with considerable teaching experience, which will also result in a higher age.

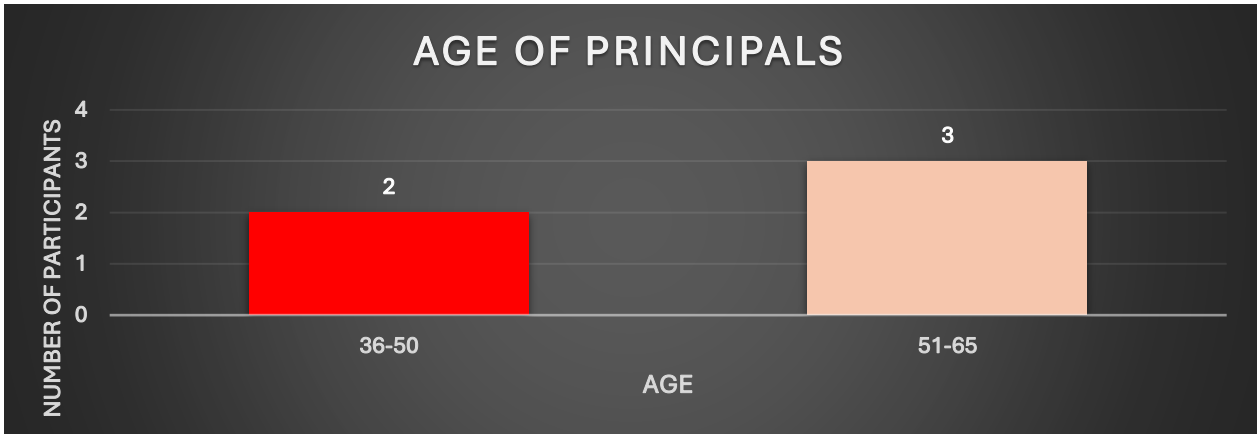

Figure 5.2: Age of principals in quintile 1-3 schools

In the quintile 1-3 schools, as shown in the figure above, two principals were between 36 and 50, and three were between 50 and 65. This data demonstrates that there is sufficient experience at these schools.

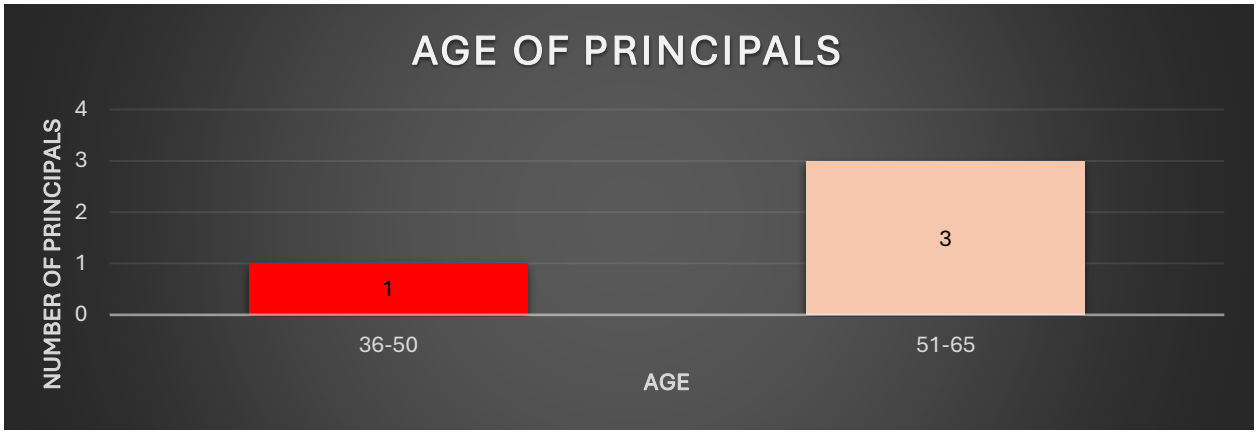

Figure 5.3: Age of principals in quintile 4-5 schools

In the figure above, one principal was aged between 36 and 50, and three principals were between the ages of 51 and 65. This data also shows that the quintile 4-5 school principals have sufficient experience.

Comparing the two categories of schools, in quintile 1-3 schools, two principals were between the ages of 36 and 50, and three principals were between the ages of 51 and 65, while in quintile 4-5 schools, one principal was between the ages of 36 and 50. Three were between the ages of 51 and 65. To gain insight into how ICT is implemented in schools, these amounts of experience were essential to this research study, as experience generally relates to more robust institutional knowledge. In other words, older or more experienced people would have had more knowledge about how to go about their tasks, thereby improving their performance and making them more reliable (Li, 2022).

The figure below illustrates teachers' ages in quintile 1-3 schools. Among the teachers, 14 were between the ages of 20 and 35, 11 were between the ages of 36 and 50, and 5 were between the ages of 51 and 65.

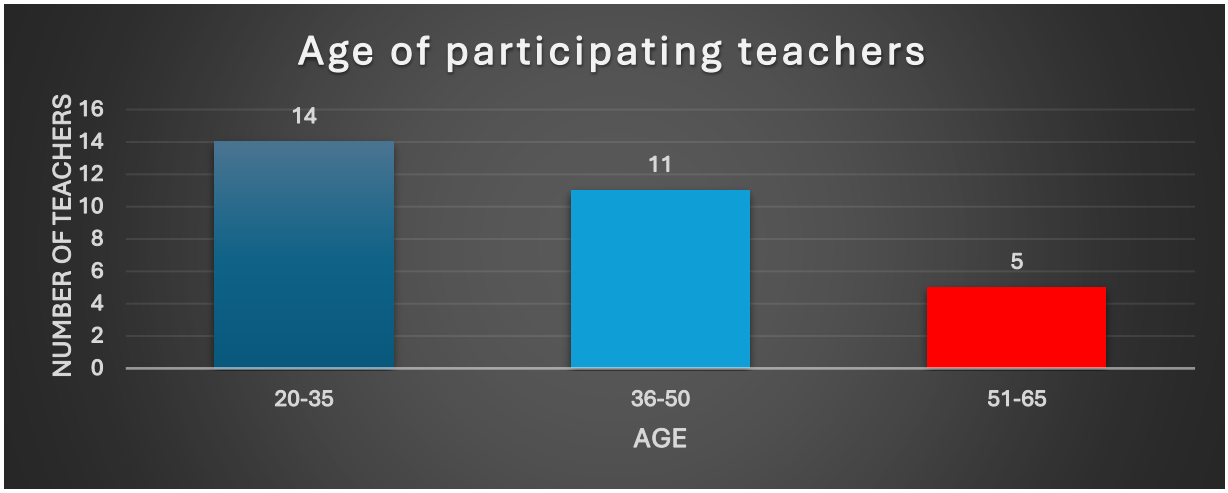

Figure 5.4: Age of teachers in quintile 1-3 schools

Figure 5.5 below illustrates teachers' ages in quintile 4-5 schools. The ages of eight teachers range from 20 to 35 years old, nine teachers range from 36 to 50, and nine teachers range from 36 to 50 years old.

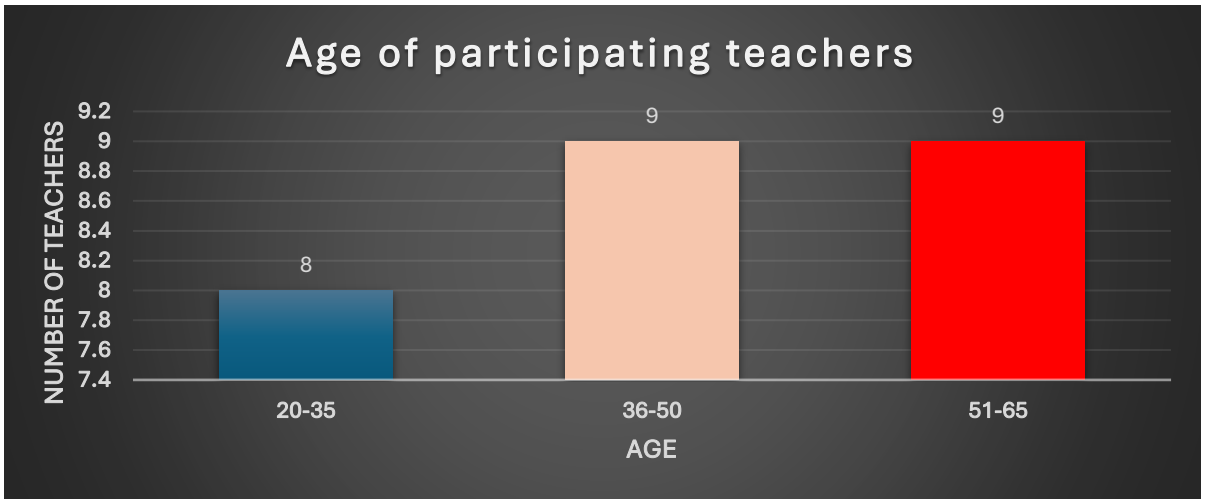

Figure 5.5: Age of teachers in quintile 4-5 schools

The focus group interviews were conducted with 22 teachers between the ages of 20 and 35, 20 between the ages of 35 and 50, and 14 between the ages of 51 and 65. There was a wide range of ages among the participants, indicating that the use of ICT in teaching is not restricted to any particular age group. When comparing the data, in quintile 1-3 schools, 47% of the teachers were between the ages of 20 and 35, 37% of the teachers were between the ages of 36 and 50, and only 16% were between the ages of 51 and 65; while on the other hand, in quintile 4-5 schools, 30% of the teachers

that participated in the study were between the ages of 20 and 35, with 35% of teachers between the ages of 36 and 50, and 35% of teachers between the ages of 51 and 65. When comparing the ages of teachers who participated in this study, it is clear that the quintile 1-3 schools' teachers were generally younger than their colleagues in quintile 4-5 schools. It is a widespread assumption that ICT interest is usually associated more strongly with the younger generation (Haleem, et al., 2022:276).

5.3.3 Teaching experience

It is estimated that the average teaching experience of the principals is twenty years. In terms of years of experience as a principal, only three principals in the study had more than ten years of experience. Three principals had more than five years of experience, while three had less than five years of experience. It was concluded that the principals had sufficient leadership and management experience and should be able to lead the implementation processes of ICT in the school. In the study, only seven teachers had less than five years of teaching experience. Although this would not necessarily affect the implementation of ICT negatively, as a few principals indicated, younger teachers were more proficient with ICT. Participant S8/P stated in this regard:

"I think the younger persons are much more skilled..."

Figure 5.6: Teaching experience of principals in quintile 1-3 schools

All five principals in the low-ranking quintile schools had 20 years or more of teaching experience.

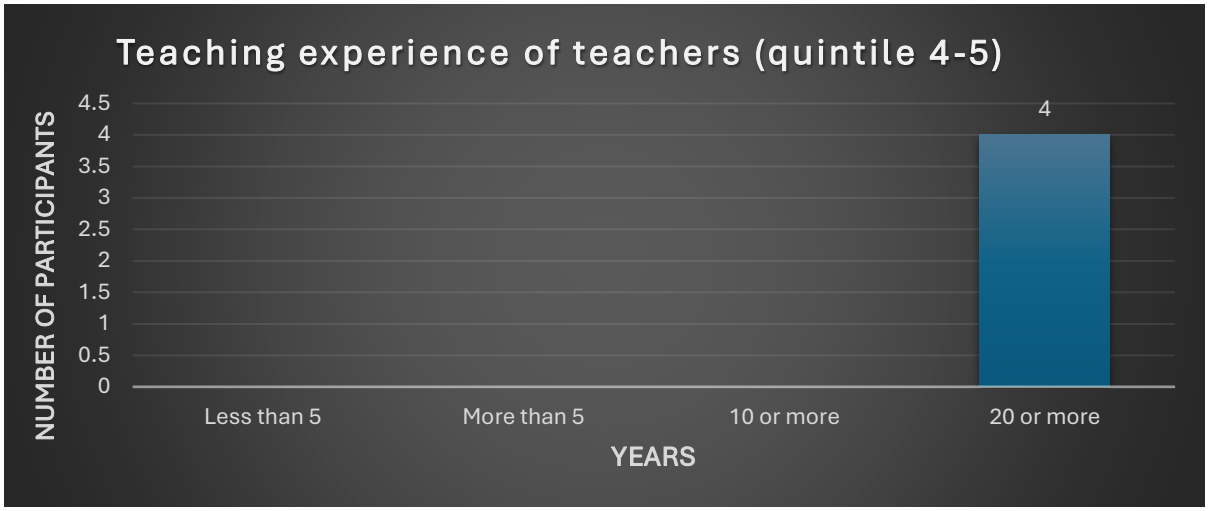

Figure 5.7: Teaching experience of principals in quintile 4-5 schools

In the schools in the high-ranking quintiles, all four principals had at least 20 years of teaching experience. Both low and high-quintile-ranking principals had more than 20 years of teaching experience. This data shows that experience was not a matter of concern in any of the schools in the study.

Among the teachers, thirteen had been teaching for at least five years, whereas seventeen had been teaching for more than ten years. Eighteen teachers had been teaching for more than twenty years.

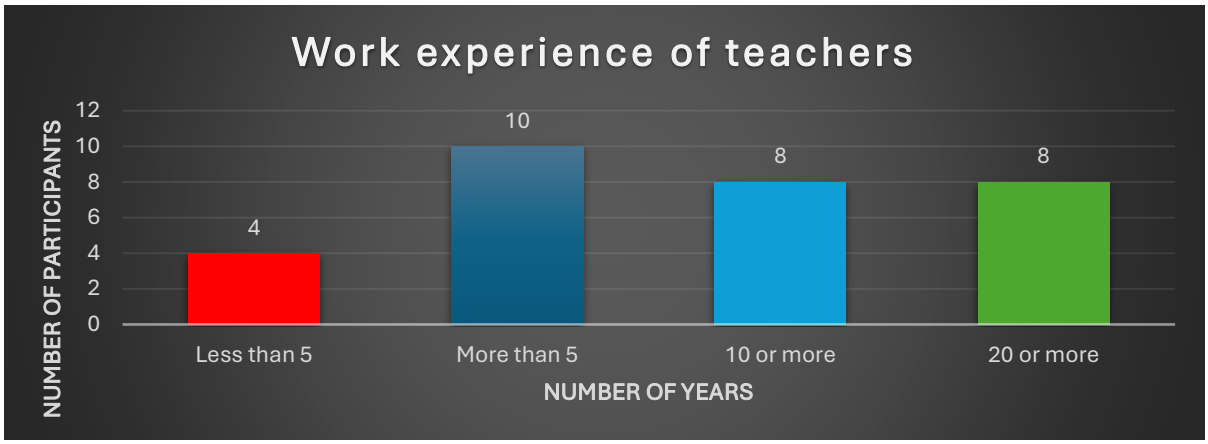

Figure 5.8: Teaching experience of teachers in quintile 1-3 schools

In quintile 1-3 schools, 4 (13.3%) teachers had less than five years of experience, 10 (33.3%) teachers had more than five years of experience, 8 (26.6%) teachers had ten years or more and 8 (26.6%) teachers had 20 years of experience.

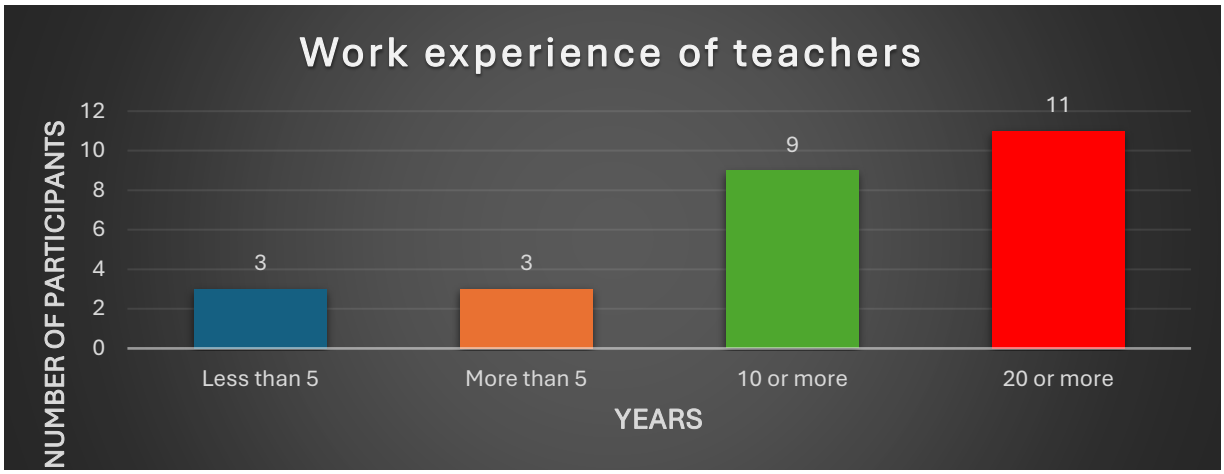

Figure 5.9: Teaching experience of teachers in quintile 4-5 schools

Among the teachers in the quintile 4-5 schools, three (11.5%) had less than five years of experience, three (11.5%) had five years or more of experience, nine (34.6%) had ten years or more of experience, and eleven (42.3%) had 20 years or more of experience.

It is evident that when comparing the schools, a more significant number of teachers in quintile 1-3 schools had less than ten years of teaching experience as opposed to teachers in quintile 4-5 schools. In addition, there was a significant difference in the years of teaching experience between the teachers in the 1-2 schools and those in the 4-5 schools. On average, teachers in schools in the quintile 4-5 group had more teaching experience than their counterparts in the quintile 1-3 group. This may be in their favour (quintile 4-5 teachers) in terms of their capabilities regarding ICT implementation.

There is no doubt that the principals and teachers in this study had a great deal of teaching experience, which could benefit them. According to Akram, Aslam, Saleem and Parveen (2021), teachers are often unable to implement innovative teaching methods due to their limited teaching experience. This study involved participants who were experienced teachers, and their expertise should assist them in guiding teachers on how to integrate ICT into the classroom.

5.3.4 Teaching qualifications

A teacher in South Africa must possess a Matriculation certificate (Grade 12) and a three-year teaching qualification (M + 3). Taylor (2021) confirms that teachers with three-year diplomas were considered adequately qualified to teach and permitted to register with professional bodies. There were no unqualified teachers employed at any of the nine schools. Most of these teachers (96%) had qualifications beyond the minimum required qualification of M + 3. As a qualified teacher, one should possess pedagogical knowledge and have completed an education, including a bachelor's degree and a certificate of competence, from an institution or university in the teaching field (Lee & Lee, 2020). Based on this. With a fair amount of confidence, it can be said that teachers are well-qualified and should be able to lay the foundation for ICT implementation.

5.3.5 Formal qualification in management

Whether principals in this study have formal qualifications in management will be reviewed in the figure and paragraph below.

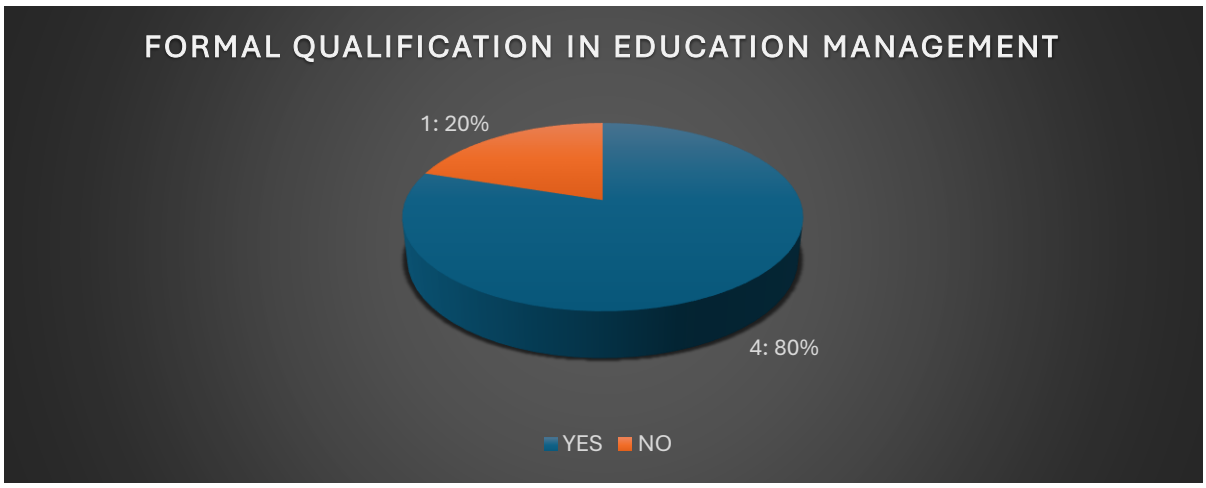

Figure 5.10: Formal qualification in education management (quintile 1-3 schools)

Based on Figure 5.10, four (80%) out of five principals in quintile 1-3 schools possessed formal education management qualifications.

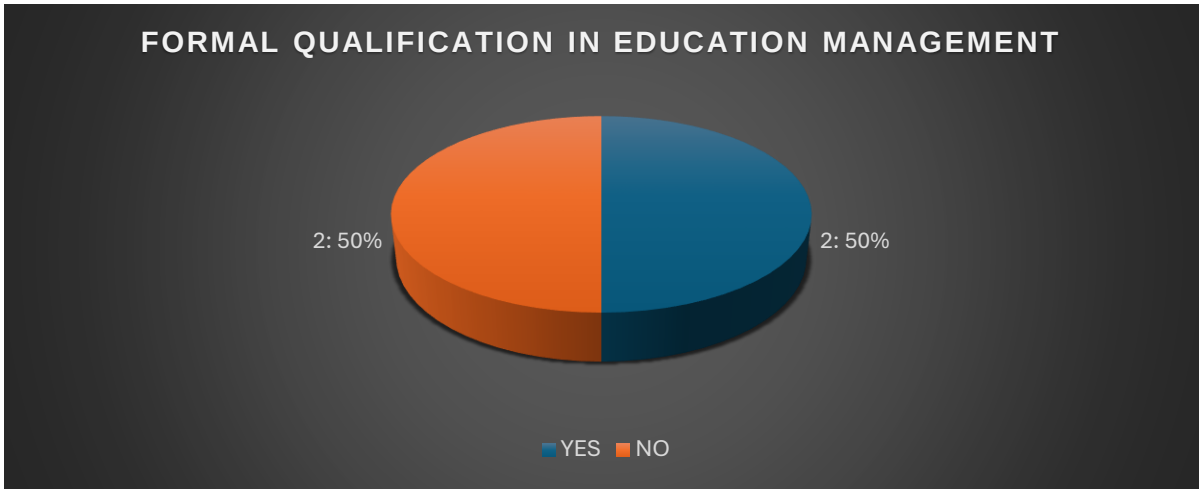

Figure 5.11: Formal qualification in education management (quintile 4-5 schools)

Figure 5.11 indicates that two (50%) of the four participating principals in quintile 4-5 schools had formal qualifications in education management. According to the findings, most of the principals of schools in quintiles 1-3 and most of the principals of schools in quintiles 4-5 understand the required skills necessary for management and leadership and are aware of them, as envisaged by the National Department of Education, which implements this qualification in collaboration with universities. Consequently, it is anticipated that principals will possess a fundamental comprehension of the management and leadership concepts necessary to carry out their responsibilities in the ICT implementation. However, it is unclear whether the roles of principals or other School Management Team (SMT) members in digital literacies are included in leadership and management course content.

5.3.6 Years of teaching with technology

Four out of the five quintile 1-3 school principals (80%) had more than five years of teaching experience with ICT. The individual interviews with principals in all of the schools indicated that not all principals had formal training in information and communication technologies.

> *"Yes, I did"* (S1/P).
>
> *"Not formal, but I just work it myself and with, it was informal, for me, it was just informal. I haven't done anything formal"* (S2/P).
>
> *"No, not that I can think of. I'm not sure, but I think yeah"* (S3/P).

"No, no formal training" (S4/P).

"Formal training. Yes, I did" (S5/P).

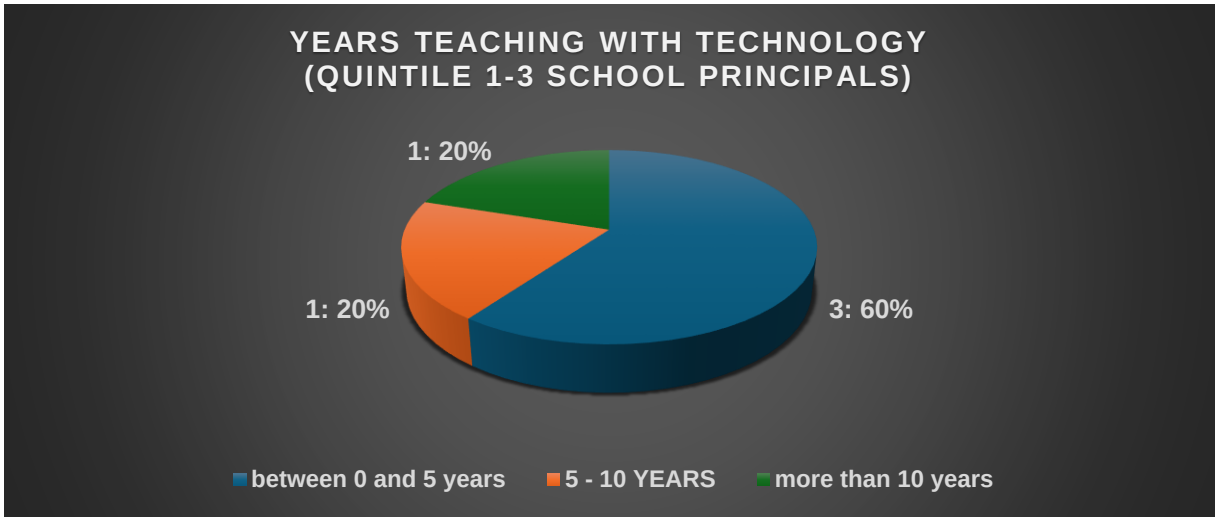

Figure 5.12: Years teaching with technology (quintile 1-3 school principals)

Compared to school principals in quintiles 4-5, three of the four principals in quintiles 1-3 (75%) had more than five years of experience teaching with ICT. In the individual interviews, few (only 25%) of the principals indicated that they had formal training in information technology.

> *"I did. I was teaching at the X College for four years. And then I did my N4 computer practice, and my N5 computer practice"* (S7/P).

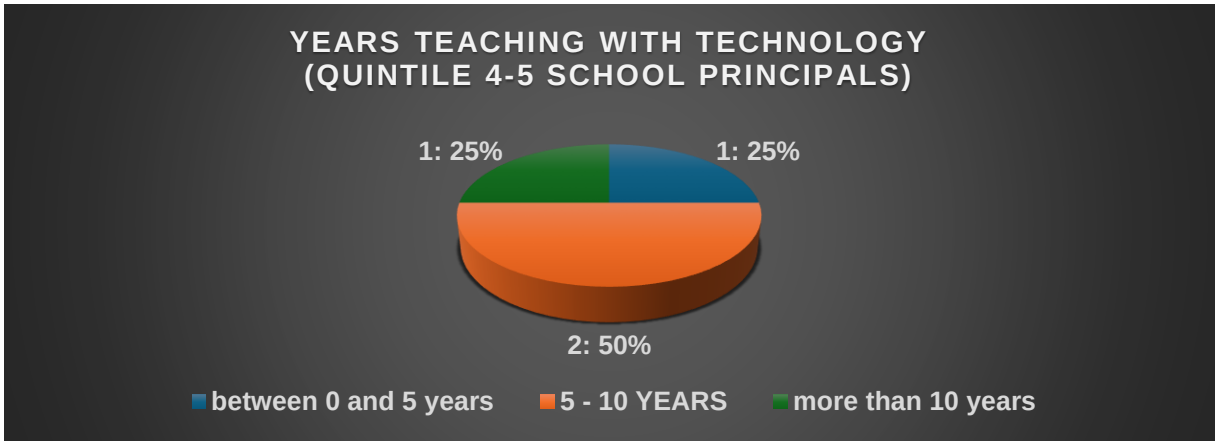

Figure 5.13: Years teaching with technology (quintile 4-5 school principals)

The data reveals that all principals in quintile 1-5 schools had a basic understanding of ICT. Therefore, most principals had experience but needed assistance learning how

to use the new educational technology. According to the Standard of Principalship, it is imperative that principals who are prepared to take on the role of technology leaders as principals be responsible for effective technology integration in the classrooms (DBE, 2016). To be effective technology leaders in their schools, principals must also receive professional development in technology leadership. McCarthy et al. (2023) argue that training principals in technology leadership is an essential step in integrating technology into teaching and learning.

The following section will cover the presentation, discussion, and analysis of the data. Codes were designed to identify and distinguish the participants and clarify the meaning of the collected data from the individual and focus group interviews. The meaning of the code (S1/P/T1;2) is the following: (S1) indicates the school that participated, while a teacher code (T) or the principal code (P) identifies the principal. There are a number associated with a specific teacher at a particular school. We can locate the school and the teacher using the code (S2/T2). The following section will present the categories and themes derived from the data.

5.4 CATEGORIES FROM DATA COLLECTION

A summary of the findings associated with each theme is presented in the following section, based on the individual interviews and the focus group discussions. Table 5.3 presents the categories and themes identified through the data collection process. Based on the individual interviews and focus group discussions, the following section discusses the findings associated with each theme. The themes and sub-themes align with the study's research questions and objectives. This allowed for a logical flow and helped readers understand how the findings responded to the questions of the study.

5.4.1 Thematic Analysis

Thematic analysis (TA) was employed in this study to analyse the data. Thematic analysis, which gained popularity in 2006 because of the work of Virginia Braun and Victoria Clarke, is a qualitative analysis technique that even non-experts may use to get fresh ideas and insights from data (Yan, Echeverria, Fernandez-Nieto, Jin, Swiecki, Zhao, Gašević & Martinez-Maldonado, 2024). Thematic analysis is a qualitative data analysis technique involving reflexivity and the researcher's subjective

experience, deriving meaning from the data. It employs in-depth interviews or focus group transcripts to find patterns and themes (Ozuem, Willis & Howell, 2022:151). When conducting a thematic analysis, researchers must first become familiar with the data, then create initial codes, compile codes with supporting information, organise codes into themes, and then check and edit these themes to ensure they are supported (Perlotto, 2024). Thematic analysis is a flexible method for researchers to identify data patterns, generate new insights, and involve participants. Still, it may present challenges in interpreting and overlooking individual phenomena (Hennink et al., 2020).

5.4.1.1 Phase 1: Familiarising yourself with the data

The thematic analysis begins with familiarising oneself with the data, which is crucial for the subsequent analytical process. This means that the researcher had to immerse herself in the content by reading and re-reading it multiple times to understand its nuances (Yanto, 2023:3125). By understanding the context, the researcher could grasp the context in which the information is presented (Seth, Chadha & Bhatia, 2022:53). This contextual understanding was essential for identifying patterns, themes, and relationships within the data (Dunk, 2021). The researcher identified key elements through repeated readings, such as recurring ideas, concepts, or phrases that may form the basis of emerging themes. This process helps organise and effectively structure the data (Schroeder, 2023). Familiarisation with the data allowed the researcher to build insight into its underlying meanings and interpretations. It enabled her to develop a comprehensive perspective beyond surface-level observations (Dawadi, 2020:64).

The researcher took the following approaches to familiarising herself with the data. First was close reading that involved a detailed examination of each piece of data to extract meaningful insights (Naeem, Ozuem, Howell & Ranfagni, 2023:5). The researcher paid attention to language use, tone, context, and any implicit messages conveyed in the text (Yanto, 2023:3121). Some of the interviews in this study were conducted in a combination of Afrikaans and English, necessitating a careful transcription on the researcher's part. The researcher had to check the transcripts against the recording a second time to ensure that an accurate account of the data

was captured, which is considered a central feature in the transcription procedure. Secondly, taking notes while familiarising oneself with the data can help capture initial thoughts, observations, and potential connections between different pieces of information. These notes served as a reference point during the later stages of analysis (Braun, 2019:591).

5.4.1.2 Phase 2: Generating initial codes (see Table 5.3 below)

The thematic analysis involves generating initial codes in the second phase, which is crucial for identifying patterns and themes in research or qualitative analysis data. Generating initial codes helps organise the data into manageable units (Ozuem et al., 2022:152). The researcher started identifying meaningful patterns by breaking down the information into smaller segments. Initial coding allowed the researcher to identify recurring ideas, concepts, or phrases within the data. These initial codes served as building blocks for developing broader themes later in the analysis process (Christou, 2023:7). Through coding, researchers engage deeply with the data, which enhances their understanding of the content. It enables them to extract critical insights and meanings embedded within the information (Naeem et al., 2023:7). The researcher began by open coding and assigning labels to different parts of the data without preconceived categories. This step involves a line-by-line analysis to capture all possible meanings (Schroeder, 2023). After open coding, the researcher moved on to axial coding, where she made connections between codes. This process helped structure and organise the initial codes into more coherent groups (Lee, Van der Lubbe, Goh & Valderas, 2024). The researcher then focused on identifying core themes from the initial codes. This step involves refining and consolidating codes to develop a comprehensive thematic framework (Braun, Clarke & Hayfield, 2024). Table 5.3 illustrates the coding of the individual and focus group interviews and the observation and documentary analysis. It should be noted that the same instruments were used for all the participants. Hence, the codes, categories, and themes were the same.

Table 5.3: Categories and themes identified in the data

RESEARCH QUESTION 1: To what extent do barriers hinder the successful implementation of ICT in different school settings?	
Code:	Barriers that hinder ICT implementation (Quintile 1-3)
Code:	Barriers that hinder ICT implementation (Quintile 4-5)
Category 1	**Themes**
1.1 Level of principals' ICT capacities (Coded from Focus Group and Individual Interviews).	1.1.1 Knowledge and utilisation of technology 1.1.2 Computer training and enhancement of skills in ICT 1.1.3 Skills and knowledge acquired for effective integration of ICT in teaching
1.2 Resource and organisational barriers (Coded from Focus Group, Individual Interviews, observations and documentary analysis).	1.2.1 Lack of ICT policy 1.2.2 ICT infrastructure-related barriers 1.2.3 Technical support challenges 1.2.4 Teacher training
RESEARCH QUESTION 2: What are the critical leadership duties and functions that principals perform in implementing ICT in various school environments?	
Code:	Leadership duties and functions (Quintile 1-3)
Code:	Leadership duties and functions (Quintile 4-5)
Category 2	**Themes**
2.1 Experience of teachers in terms of ICT implementation and support (Coded from Focus Group, Individual Interviews, observations and documentary analysis).	2.1.1 The value of ICT in instruction 2.1.2 The utilisation and provisioning of ICT tools in instruction: The need for principals to understand ICT tools 2.1.3 Principals' role in enhancing collaboration among teachers 2.1.4 The need for ICT training
2.2 Principals' views on their roles in ICT-implementation (Coded from Focus Group,	2.2.1 Teachers' ICT capabilities

Individual interviews, observations and documentary analysis).	2.2.2 Addressing limitations of staff in terms of ICT skills through professional development 2.2.3 Strategies to encourage and motivate teachers 2.2.4 Leadership approaches of the principal for effective ICT Implementation 2.2.5 Leadership roles of SMT members
RESEARCH QUESTION 3: What are principals' key management responsibilities and roles in ICT implementation in different school settings?	
Code:	Management responsibilities and roles of principals (Quintile 1-3)
Code:	Management responsibilities and roles of principals (Quintile 4-5)
Category 3	**Themes**
3.1 Execution of management roles of principals in ICT implementation (Coded from Focus Group, Individual Interviews, observations and documentary analysis).	3.1.1 Planning of ICT implementation 3.1.2 Principals' support to teachers in planning and integrating ICT in the classroom 3.1.3 Communication of the school's ICT goals and vision to staff 3.1.4 Monitoring the proper use of ICT 3.1.5 Management of ICT hardware and software 3.1.6 Management of infrastructure
RESEARCH QUESTION 4: Which strategies should principals use for successful ICT implementation across different school settings?	
Code:	Strategies for successful ICT implementation (Quintile 1-3)
Code:	Strategies for successful ICT implementation (Quintile 4-5)
Category 4	**Themes**

4.1 Strategies for successful ICT Implementation (Coded from Focus Group, Individual Interviews, observations and documentary analysis).	4.1.1 Leadership strategies 4.1.2 Management strategies

5.4.1.3 Phase 3: Searching for themes

Phase 3 involves searching for themes within the qualitative data (Kiger & Varpio, 2020:848). This step is crucial as it requires the researcher to identify patterns, recurring ideas, and common threads that emerge from the data (Lochmiller, 2021). The researcher immersed herself in the data, which involved reading and re-reading transcripts to comprehensively understand the content (Terry & Hayfield, 2020). The researcher started by coding data segments that stood out or seemed significant, capturing key ideas or concepts in the data. Based on the initial coding, the researcher began to group similar codes to form potential themes, and connections and relationships between codes were sought (Lester, Cho & Lochmiller, 2020:91). Once initial themes were generated, the researcher reviewed them to ensure that they accurately reflected the data and captured its essence. A check was done to ensure that each theme was coherent, distinctive, and meaningful concerning the research objectives (Naeem et al., 2023:7). The researcher defined each theme clearly by outlining what it represented in the data. Each theme was given a descriptive name that encapsulated its core idea or concept (Campbell, Orr, Durepos, Nguyen, Li, Whitmore, Gehrke, Graham & Jack, 2021:2019). The researcher refined and fine-tuned the identified themes by revisiting the data and ensuring it was consistent with the underlying content. Adjustments were made as needed to create a clear and cohesive set of themes (Roberts, Dowell & Nie, 2019:7). The researcher then looked for patterns that cut across different segments of the data, indicating commonalities or variations in how the themes manifested within the dataset (Naeem et al., 2023:7). Throughout this process, the researcher maintained reflexivity by critically reflecting on how her own biases or preconceptions might influence theme identification. She remained open-minded and receptive to unexpected findings (Lester et al., 2020:91). The researcher consulted with her study supervisor to validate the identified themes and ensure their robustness and relevance to the research context. The researcher

documented all steps during theme searching, including decisions, changes implemented, and rationale behind theme selection. This documentation is essential for the transparency and reproducibility of the analysis (Ozuem et al., 2022:152).

5.4.1.4 Phase 4: Review themes

Phase 4 involves examining identified themes to ensure accurate data representation and meaningful insights, refining and consolidating them before finalising the analysis (Yan et al., 2024). The researcher critically examined how themes were categorised based on the data. She assessed whether each theme captured the essence of the responses and if any adjustments were needed (Naeem et al., 2023:10). During the review, the researcher explored how themes related to each other within the dataset. She looked for connections, overlaps, or contradictions between themes to understand better the underlying patterns (Lawless & Chen, 2019). The researcher checked for any inconsistencies or discrepancies in how themes had been developed and whether they aligned with the research objectives (Peel, 2020). The researcher remained vigilant for any potential observer bias that influenced theme development. By acknowledging and addressing bias, the researcher enhanced the credibility and reliability of her thematic analysis (Majumdar, 2022:611). The researcher clarified theme names and definitions to improve clarity and accuracy. This step helps ensure that each theme accurately represents its content (Cernasev & Axon, 2023:752). The researcher merged related themes into broader categories and split complex themes into more specific sub-themes. This process aims to streamline the analysis and enhance its coherence (Freeman & Sullivan, 2019:171). The researcher evaluated themes based on their relevance to the research questions and ability to explain significant aspects of the data (Thompson, 2022:1416). She prioritised themes that offered meaningful insights into the phenomenon under study. The researcher finalised the structure of the thematic analysis, ensuring that it effectively captured the essential findings and interpretations derived from the qualitative data.

5.4.1.5 Phase 5: Defining and naming themes

The fifth phase of data analysis involves identifying and naming themes, a crucial step in identifying patterns of meaning within collected data (Perlotto, 2024). The first part

of this phase involves closely examining the data to identify recurring patterns, topics, or issues that emerge from the dataset (Cernasev & Axon, 2023:752). The researcher looked for similarities, differences, and relationships between different pieces of data (Naeem et al., 2023:10). Once patterns were identified, the researcher grouped related pieces of data to form clusters. These clusters represent potential themes that capture essential aspects of the data (Thompson, 2022:1416). The researcher then generated initial themes based on the grouped data clusters. These initial themes are broad descriptions that encapsulate the essence of each data cluster (Braun & Clarke, 2022). The researcher reviewed and refined the initial themes by revisiting the data to ensure that each theme accurately represented the content it encompassed. Based on this review process, some themes were merged, split, or discarded (Yanto, 2023). After refining the themes, the researcher defined each theme by providing clear descriptions outlining what each represented concerning the research question or objective. The final step in this phase is naming the defined themes (Ozuem et al., 2022:153). The researcher chose concise and descriptive names for each theme that effectively captured its core concept or idea. Throughout this process, the researcher ensured consistency in how themes were defined and named across the dataset to maintain coherence and clarity in the analysis (Thompson, 2022:1416).

5.4.1.6 Phase 6: Producing the findings

Phase 6 of thematic analysis involves synthesising and presenting the analysed data coherently and structured to produce the study's findings (Schroeder, 2023). The researcher compiled all the coded data, themes, and sub-themes identified during the analysis. She ensured that all relevant information was included and organised effectively (Naeem et al., 2023:7). The findings are presented in a narrative form that tells a story based on the identified themes. This narrative should flow logically and provide insights into the research (Sundler, Lindberg, Nilsson & Palmér, 2019:736). The researcher included specific participant examples or quotes to illustrate each theme or sub-theme. These examples help to bring the findings to life and provide concrete evidence to support the identified themes (Thompson, 2022:1416). The researcher compared themes to highlight similarities, differences, and relationships between them. This comparative analysis adds depth to the findings and can lead to further insights (Dawadi, 2020). The researcher interpreted the meaning of each

theme concerning the research objectives. She discussed the implications of the findings, drew conclusions, and considered how these findings contribute to existing knowledge in the field (Xu & Zammit, 2020:7). The final step involves presenting clear conclusions based on the thematic analysis findings (Sundler et al., 2019:736). The researcher summarised key insights, implications for practice or policy, and suggestions for future research directions (Naeem et al., 2023:8). Finally, the researcher wrote up her findings in a comprehensive report or paper that follows a structured format (Thompson, 2022:1417). The report typically includes an introduction, methodology section, and results section detailing the identified themes, discussion of findings, conclusions and recommendations (Xu & Zammit, 2020:7).

5.4.1.7 Limitations of thematic analysis

Despite its usefulness in qualitative research, thematic analysis comes with several disadvantages that researchers need to consider (Kiger & Varpio, 2020). Thematic analysis faces challenges due to its subjectivity, as it relies heavily on the researcher's interpretations, potentially resulting in variations in the analysis and thereby affecting the reliability of the findings (Alahou, 2023). While identifying and characterising data themes, the thematic analysis may ignore connections or broader implications, resulting in an incomplete interpretation and possibly incorrect conclusions (Buckley, Tickle, Eagle & Dawson, 2024). Researchers face a complex problem regarding thematic analysis because it is a labour-intensive and time-consuming process that requires careful coding and organisation of enormous datasets (Christou, 2023). The effectiveness of thematic analysis mostly depends on the researcher's judgment regarding theme identification and coding, which can lead to bias and perhaps distorted results (Ozuem et al., 2022:151). Due to its emphasis on detecting distinct themes, thematic analysis may have trouble handling complicated or multidimensional datasets, possibly missing subtle correlations between data points (Cartwright, 2020). In conclusion, although thematic analysis provides insightful analyses of qualitative data, researchers should be conscious of its limits in handling complicated datasets, subjectivity, time restrictions, and data interpretation (Alahou, 2023).

5.4.2 Category 1.1: Level of principals' ICT capacities

The first theme focused on the ICT capacity of principals as a possible barrier to efficient ICT implementation. Uğur and Koç (2019:45) declare that principals who lack skill in the use of technology may struggle to provide sufficient support to teachers. Therefore, it was essential to establish whether principals provided enough opportunities for teachers to use ICT in the classroom.

5.4.2.1 Theme 1.1.1: Knowledge and utilisation of technology

The data demonstrates that the principals of all nine schools use computers daily in all quintiles 1 to 5. To promote digital development within their schools and carry this practice into the classroom, transformational leaders must take proactive measures to close knowledge gaps about technology (Hamzah et al., 2021:217). The principals acknowledged that computers are part of their daily routine and used for various administrative purposes. This is evident from the following responses:

> *"Administration, personal stuff, SA SAMS, I use it for many things. Nearly everything, even for WhatsApp"* (S1/P).
>
> *"…mainly for correspondence to parents, emails and correspondence to the department or receiving emails back from the department"* (S3/P).
>
> *"Typing letters, emails. Yeah, I use the computer. And for research"* (S4/P).
>
> *"Mostly for entering and capturing marks, sending emails, compiling exam papers, surfing the internet for exam papers. The department also sends their information and their circulars via the emails. So, we can't actually go without… if we don't have electricity, we sit with our hands folded"* (S6/P).
>
> *"I'm using it for administrative purposes, emailing, MS Teams meetings, drawing up tests, exams, worksheets (as a teacher), editing, everything you can think of"* (S7/P).

This finding indicates that technology, in general, and schools have evolved rapidly over the past few years. Furthermore, this is supported by Haleem et al. (2022:276), who claim that the globalisation of education has necessitated the use of digital technologies in teaching and learning. Hence, it was interesting to note that some principals – who seem to have teaching responsibilities as well – use ICT devices for activities related to teaching and learning. This finding aligns with Makanda, Mbaruku and Kalay (2022:142), who agree that teachers must adapt and renovate their

teaching practices by daily utilising information and communication technologies. It can also be deduced from the data that principals utilise technology to streamline the school's administration and ensure smooth operation. This finding is confirmed by Garcia, Abrego and Jauregui (2019:95), who agree that principals use computers daily for administrative purposes.

In response to the question in the individual interviews about the computer programs they use, all principals cited MS Word as the most used program. One possible reason for this is that MS Word may be considered one of the most accessible programs to use in Windows. Another possible reason is because of its invaluable role in the completion of administrative responsibilities. Another interesting finding was that there was no clear distinction between the Microsoft programs used by low and high-quintile schools. This may be a sign that schools of all socio-economic backgrounds recognise that technology is an integral part of education in the 21st century (Joynes et al., 2019). This is confirmed by the feedback from some principals in quintile 1-3 schools, which use a reasonably complex program such as Excel for tasks:

> *"I use Excel when I have to do statistics. I use Google a lot. Yeah, I think mostly, I use the two – Word and Excel (S1/P). Word, PowerPoint, Excel"* (S2/P).
>
> *"Yes, it's using the internet, emails…"* (S3/P).
>
> *"I am on the SA SAMS…"* (S5/P).

The data shows, however, that when it comes to implementing technology in teaching and learning, schools in quintile 4-5 more readily use educational software. This is evident from the following responses:

> *"How would I… I might say moderate, but at least you know what? As you keep on using the computer, you develop your skills more, and you start using it and more. Yeah, but I mean, as I say I do prepare lessons which I also use in the class, which I can do at home and then I bring it to the class and use it there"* (S6/P).
>
> *"…if I'm drawing up a test, or I'm drawing up a worksheet or if I'm projecting a PowerPoint presentation"* (S7/P).
>
> *"I do use computers for teaching and learning. I use even for tasks these days; we use our computers. Because learners have to record themselves when they do the oral, and send the oral work to us. We even ask them, when they don't have dictionaries, to*

use Google to find dictionary words. We show them videos, so we use computers often" (S1/P).

This finding of teachers utilising ICT for various purposes was confirmed by research conducted by Dogan et al. (2021:1328), who points out that educational software usage increases in schools as teachers feel more comfortable using technology in their teaching process. Principals 'understanding of ICT will enable them to support teachers better.

5.4.2.2 Theme 1.1.2: Computer training and enhancement of skills in ICT

Current and future teachers must keep abreast of technological advancements in education. To enhance teaching and learning environments with students, teachers are expected to develop innovative ways to use technologies as tools (Kopish & Marques, 2020:46). Therefore, principals, as instructional leaders, should "respond to the 21st-century demands of learners in the teaching and learning situation" (DBE, 2016:12). Training and Continuous Professional Development (CPD) for principals in ICT is, therefore, a must. The interviews revealed, however, that only two principals from quintile 1-3 schools (S1 and S5) had received formal training in ICT and that CPD training is insufficient. Principals who are not tech savvy cannot effectively evaluate how teachers and students use technology for education and achievement in their roles as instructional leaders in the classroom (Uğur & Koç, 2019:45). Another principal responded as follows to the issue of formal training:

"Not formal, but I just work it myself and with, it was informal, for me it was just informal. I haven't done anything formal" (S2/P).

Comparatively, only one principal from a quintile 4-5 school had received formal training. As previously mentioned, the principal of School 7 (S7) responded as follows:

"I actually did. I was teaching at the X College for four years. And then I did my N4 computer practice, and my N5 computer practice. A few of us thought – we're sitting here now, why don't we… Why don't we do this? – but we taught ourselves, and we wrote the exam" (S7/P).

In addition, she explained that the training she received enabled her to work more efficiently with computers.

"Well, it made it possible for me to use it efficiently. You know, because if I didn't have that training, I wouldn't be able to now, let's say, do a PowerPoint or edit a document or, you know, send a lot of emails, receive a lot of emails, download documents, work with a document" (S7/P).

In quintile 1-3 and 4-5 schools, only a few principals had received formal training in information and communication technologies. Most teachers in quintile 1-3 schools acknowledged receiving formal computer training. According to Dlamini and Dewa (2021:30), there is evidence that schools in quintiles 4 and 5 have a professional development programme for their teachers and technology resources. It is possible that principals do not regard ICT training as a priority. Another possibility is that the Department's training opportunities are insufficient.

5.4.2.3 Theme 1.1.3: Skills and knowledge acquired for effective integration of ICT in teaching

The data under this theme showed that principals do not provide sufficient training opportunities to their teachers. The participants from quintile 1-3 schools highlighted the need for teachers to have training in new software programs, technical skills, data capturing and how to work with the devices. One participant (S4/T3) said:

"I think it must be the basics. To start from the beginning with the basics and build from there."

This clearly indicates that there is a need for intervention regarding improving staff computer skills. This alludes to the need for teachers and principals to manage the digital divide (cf. 2.9.5). This intervention should include support in ICT training. Participants S1/T2 believe training should be relevant and valuable in the classroom. Concerning an ICT-enhanced classroom, Abdulrahman et al. (2020:12) agree that technology knowledge involves more than simply mastering hardware and software. Participant S1/T2 reported that teachers at their school are not on the same level as those at other schools. This finding shows that training needs for teachers differ and that a "one size fits all" model is not desired:

"Training. From the book to the laptop to the screen to the gadgets of the kids. That kind of training it will help us even when we're at home to make a lesson after school

and send it to the kids …Yes, for ICT and technology, there's always additional training that you need" (S1/T2).

The findings from the data above indicate that principals are unaware of the needs of their staff regarding ICT skills and training for effective ICT integration in the classroom. The data shows that there is very little intervention from the principals to support teachers at any of the quintile 1-3 schools. The PAM document (DBE, 2016:33) specifies that the principal is responsible for developing staff training programmes (which should include ICT). Almutairi (2018:96) emphasises that schools need leaders who understand technology's potential and future evolution to integrate it into teaching and learning, as this is essential for developing school ICT. Unfortunately, the findings in this study show that proper coordination (cf. 2.9.1) and effective management of the digital divide are lacking (cf. 2.9.5).

The data collected from the quintile 4-5 schools shows that the skill levels of the teachers and principals also vary. Participant S9/T5, for example, noted that most of the teachers at the school have basic skills but posed the following question: *"Do they know that there is still a lot that you can do with technology"?* This teacher elaborated further:

> *"So baie van ons is nog op vlak 1. Jy weet hoe om 'n Word dokument te tik, jy weet hoe om 'n PowerPoint te maak. Weet jy wat jy nog ekstra kan doen?"* (S9/T5)
>
> [So many of us are still at level 1. You know how to type a Word document; you know how to make a PowerPoint. Do you know what more you can do?]

The assessment of teacher effectiveness poses a challenge, however, particularly in the use of ICT, as ministries of education expect ICT to improve the quality of education (Meladi & Awolusi, 2019:49). When comparing the data from the two different quintile groups though, it seems that at both quintile 1-3 and 4-5 schools, there is still a need for improved ICT skills. To address this issue, principals should plan for teachers to be trained in technology-savvy skills and to be able to use computers for teaching and learning (Dlamini & Mbatha, 2018:19). Based on the responses, and it appears that the teachers agree that they need additional skills in ICT to improve their ability to teach using ICT. This finding aligns with the work of Karunaratne et al. (2018:134), who suggest that teachers lack basic computer skills despite participating in workshops on learning management systems. This finding is also supported by Tondeur, Forkosh-Baruch, Prestridge, Albion and Edirisinghe

(2016:111), who confirm that the use of ICT by teachers is insufficient to enable them to improve their practice. This indicates the need for the principals to organise professional development sessions (DBE, 2016) to improve the skills and knowledge of teachers acquired for effective integration of ICT in teaching.

5.4.3 Category 1.2: Resource and organisational barriers

The second category also addressed resource and organisational barriers. These barriers included the unavailability of ICT policies (cf. 3.5.2), infrastructure-related barriers (cf. 3.3.3), lack of access to ICT equipment (cf. 3.4.7) and a lack of technical support (cf. 3.3.3.4).

5.4.3.1 Theme 1.2.1: Lack of ICT policies

The data from the focus group interviews with the teachers of the quintile 1-3 schools reveals that ICT policies are lacking at most of the schools. This finding was confirmed in the analysis of the documents, which confirmed that ICT policies were available at only three of the nine schools selected. These include essential policies such as the White Paper on E-education (2004), the implementation strategy for e-education in South Africa (2013-2025), the professional development framework for digital learning and the cybercrimes and cyber security bill (cf. 2.5.1-2.5.4). The following remarks are indicative of the absence of ICT policies:

> *"There is a hidden ICT policy that they don't know of. There is a policy; that's why I say it's a hidden ICT policy because it is only I know, and the principal knows; no, there's one, and the deputy knows there's an ICT policy, but the teachers at the school don't know because they never saw it"* (S1/T2).

This finding demonstrates that most of principals do not adhere to what "the Standard" (DBE, 2016:15) expects of them, and that is that school policies (including ICT policies) should be developed, implemented, and compliant with educational legislation and policies. This is a significant concern, as the ICT policy plan outlines learning objectives for using ICT, making it a potentially powerful tool for facilitating educational change (Cifuentes & Vanderlinde, 2015:134). In addition, if principals ensure that ICT policies are implemented, this will improve the chances for efficient ICT implementation. The documentary analysis further confirmed that the policies

were incomplete and lacked rigour regarding strategic plans, aims, goals and regular meetings (cf. 2.5).

Regarding implementing ICT policies and guidelines, the study showed that the situation is evident in quintile 4-5 schools. The documentary analysis disclosed that School 9 had policies that relate to ICT, such as cyberbullying and a closed-circuit television policy. This lack of policy hampers ICT implementation. The Standard (DBE, 2016:8) stipulates clearly that principals (cf. 2.6.5.2) should "keep up to date with current developments in national education policy". The responses of S9/T6 and S6/P attest to this issue, while S8/T2 also alludes to the lack of written guidelines on ICT integration.

> *"Not really guidelines, but when we get assessed, they do see what is available in your class. And we do get assessed on that… But there's not written down guidelines"* (S8/T2).

This study shows that teachers demonstrated awareness of what is expected of them. The lack of policy attention is concerning, as Alenezi (2019:230) warns, as ICT implementation in schools is hindered in cases where policies are not implemented. As for instructional leaders, policies provide direction to improve instructional practices (Rigby, Forman & Lewis, 2021:238). It should be noted that principals may be unaware of this important leadership role they need to fulfil. This notion is supported by Kamalizeni and Naidoo (2018:104), who claim that having a shared vision about technology implementation and having an ICT policy plan has only recently been given attention at the organisational level. They may also not see the need for an ICT policy. Alenezi (2019:230) confirms that there is the possibility that the school principal is unable to aid the school regarding the development and implementation of an ICT policy, as well as not seeing the need for such a policy. This was confirmed when the researcher asked for written policies, which few schools could provide.

5.4.3.2 Theme 1.2.2: ICT infrastructure-related barriers

The findings revealed that quintiles 1-3 schools experience some challenging infrastructure-related barriers. These include lack of internet access (S1/T2), challenges with the network, and load-shedding. Sometimes, the internet is only available in the school's administrative buildings. This finding contradicts the

expectation of the Standard of Principalship (DBE, 2016:14), which stipulates that it forms part of the principal's management role to ensure that teachers and learners have regular access to ICT laboratories. Consequently, the lack of access disadvantages learners in technology usage in classrooms. The data reveals that some schools have limited educational budgets that hinder them from providing ICT infrastructure (S1/T2), mainly because high learner enrolment numbers are evident and lead to provision challenges, as was voiced by participant S2/T3:

> "*In our school, we have more than 2000 learners. So, for 40 computers…".*

High learner enrolment in classrooms is regarded as one of the leading causes of the shortcomings in computer provision. This was further supported by evidence from the observation that ICT resources, such as computers, are insufficient at schools in quintiles 1-3 to meet the needs of the students enrolled (cf. Table 5.1), and evident from the following comment:

> *"The problem also with computers, we have very big classes. So, like 45, some classes are 50 in a class, so how do you accommodate all of them? And if you split them up, who is going to look after the children that are not at the computers? We don't have enough staff, so the practical side is also going to be difficult"* (S4/T1).

This finding is supported by Satveer (2017:358), who claims that insufficient computer resources in remote locations and maintaining the correct ratio of students and systems in educational institutes are significant challenges that must be addressed. Other studies have confirmed that these barriers are associated with infrastructure. Zeng et al. (2018) also found that a dearth of funds and the cost of ICT infrastructure, electricity, and internet issues hamper ICT implementation. It is possible that – due to the financial constraints experienced in low quintile schools – principals cannot ensure that infrastructure is sufficient for ICT implementation. Francis et al. (2017:75) emphasise that having computers, printers, multimedia projectors, scanners, and other resources is necessary to implement ICT policies in schools. However, Van Deventer (2016) cautions that the lack of appropriate resources will hamper policy implementation.

The data also demonstrates that other problems obstructing ITC implementation exist at low-quintile schools. Participants S1/T2 and S5/T2 claimed that their school's software was outdated and lacked modern equipment. This issue was pointed out

under 5.4.2.1 as well and was a recurring issue mentioned by teachers at two low-quintile ranking schools:

> *"Also, what we currently have is a bit outdated. So, I would say from the school's side, if they could maybe update it, get new laptops or programs that we can install, or the hardware to help upgrade what we currently have, then it might also help"* (S5/T1).

> *"Ek dink as ons weer kan rekenaars kry, ons rekenaars is mos al baie oud, en dit moet opgedateer word. Eintlik gaan dit oor die finansies, sodat ons die rekenaar sentrum weer kan gebruik waar elke kind op haar eie rekenaar kan werk. En ek dink die programme is ook nou al verouder, want ons het dit nou 2 jaar nie gebruik nie"* (S3/T1).

> [I think if we can get computers again, our computers are already very old, and they need to be updated. Actually, it is about finances, so that we can use the computer centre again where each child can work on her own computer. And I think the programs are also outdated now because we haven't used them for two years now.]

Participant S2/T4 indicated that the school has smartboards (interactive whiteboards), but they were not connected and locked away. This situation may be ascribed to principals' lack of interest and expertise or even a lack of funds. Dei (2018:2) and Francis et al. (2017:75) confirm that the high cost and maintenance of ICT infrastructure have hindered the adoption and implementation of ICT in schools. The data suggests that the thorough integration of ICT was not feasible at S3/T4's school due to inefficient hardware and software, which is regarded as a school barrier by Van Der Bijl (Van Deventer, 2016:442). The documentary analysis also showed that schools' ICT policies don't provide an ICT budget. As a result, teachers could not use them, as S5/T2 also explained:

> *"En ons kan nie regtig veel sê van die software nie, want soos daar gesê is, dis outdated en al sit jy hoeveel software voor 'n mens, as jy nie die actual tool het om daai software te gebruik nie, dan wat help dit?"* (S5/T2)

> [And we can't really say much about the software because, as has been said, it's outdated, and no matter how much software you put in front of a person, if you don't have the actual tool to use that software, then what good does it do?]

Other serious challenges experienced are a lack of proper security (break-ins were experienced at schools 3 and 4), a lack of capacity to work the ICT equipment, and a lack of technical support (S5/T2). As a result, the teaching and learning process is hindered. This is another poor reflection on the management skills of principals, who

are supposed to organise infrastructure and the effectual application of resources (Ngobo & Mestry, 2018:4). Health and safety issues are also not addressed in the policy documents. At one of the quintiles 1-3 schools, there is only a one-sentence reference to the issue of safety:

> "*School will operate all ICT equipment in compliance with Health and Safety requirements."*

Based on her observations of the surroundings, the researcher concludes that most quintile 1-3 schools lack appropriate safety requirements. However, one should have empathy with principals and their staff, who may find the safeguarding of ICT equipment in schools surrounded by poverty and crime-stricken neighbourhoods a daunting challenge:

> *"First of all, safety in the classes, because we have break ins, securities still there. So, the classes can be made – security at the classes, like safety gates and stuff like that"* (S4/T1).

In the quintile 4-5 schools, on the other hand, participants claimed that their school's ICT infrastructure enabled them to implement ICT. Ndiritu et al. (2018:29) suggest that it is important for teachers to adopt ICT in their classes and for school managers to oversee the provision of ICT infrastructure in their schools. Most teachers and principals mentioned that ICT infrastructure was adequate for ICT implementation in the classroom. In the researcher's observation, network connectivity appeared to be vital in facilitating effective ICT implementation within quintile 4-5 schools. The excerpt from participant S9/T1 is evidence of this:

> *"Daar is nog net 'n paar klasse wat al die interaktiewe witborde gekry het, maar hulle het dit hierdie jaar nou begin upgrade, so mettertyd gaan almal dit ook hê. Maar al die klasse het 'n TV wat hulle kan gebruik nogsteeds, en almal het access tot internet"*
>
> [There are still only a few classes that have already got interactive whiteboards, but they started upgrading them this year, so in time, everyone will have them too. But all the classes still have a TV that they can use, and everyone has access to the internet.]

The findings at quintile 1-3 schools contrast sharply with participants' views in quintile 4-5 schools. Infrastructure seems to be better in general at quintile 4-5 schools. They (S7Group, S8/T2, S7/T3, S9/Group) reported that their school had the necessary hardware and software to effectively use ICT in teaching and learning. The

observations revealed that both hardware and software were present; this included essential components such as computers, interactive whiteboards, projectors, educational software applications, internet connectivity, and other technological tools to enhance the academic experience. The quality of the equipment observed also appeared to be satisfactory. Aikins and Arthur-Nyarko (2019:487) and Salam et al. (2018:253) explain that this may be attributed to sound management principles such as planning and controlling facilities. Participant S8/P also mentioned that the school ensured that new computers and software were purchased and that old ones were donated to needy schools. Although better management practices may exist at schools in the higher quintiles, they may experience far fewer contextual and financial challenges than their counterparts in the lower quintiles. This was confirmed by the researcher's observation that there were more readily available and well-maintained ICT resources in the schools in the higher quintiles.

However, teachers from schools in quintiles 4-5 also reported limitations regarding specific barriers that hinder ICT implementation. These were not as many as in the quintile 1-3 schools. For instance, Participant S6/T5 pointed out that they only had one technician who was also a teacher. Van der Bijl (in Van Deventer, 2016:442) confirms this finding by stating that teachers often rely on themselves to solve ICT problems. Participant S7/T5 cited load shedding as the principal problem, while participants S7/T5 and S7/T6 indicated outdated software as a severe limitation, while participant S9/T2 stated the lack of time as a constraint. These difficulties were also observed at schools with higher quintile rankings, suggesting that there are still significant barriers to the efficient use of ICT in the classroom. Zeng et al. (2018) refer to the common factors responsible for the hindrance of ICT implementation in public schools globally, including a lack of technical support, electricity, and internet issues. Mohebi and Davi (2019:4-5) confirm that teachers often claim integrating technology into their classrooms requires much preparation and implementation time.

From the data, it can be deduced that quintile 4-5 schools are better equipped to deal with the challenges related to ICT infrastructure:

> *"En partykeer is die Wi Fi maar net af vir 'n rukkie, maar ons IT ou is gewoonlik vinnig om dit weer reg te maak, en dan kan ons weer aangaan"* (S9/T6).
>
> [And sometimes the Wi-Fi is only down for a while, but our IT guy is usually quick to fix it again, and then we're good to go again.]

The researcher could not confirm the findings above in the documentary analysis. In some cases, the participants were also concerned about the lack of accessibility to ICT equipment, particularly in schools in quintiles 1-3. Participant S5/T3 explained that ICT equipment was locked away, and teachers could not access it. Other challenges include a lack of computer access and designated times for visits to the computer laboratory.

5.4.3.3 Theme 1.2.3: Lack of technical support

An interesting finding from the responses of the quintile 1-3 schools is that they do not have a technician available to assist teachers when they encounter technical difficulties. Lack of efficient technical support discourages teachers from implementing technology in their teaching. The lack of technical support is also pointed out in the research by Zeng et al. (2018), who regard this aspect as a hindrance to ICT implementation. Teachers don't want to experience a simple fault in the laboratory without technical support (Molina, 2021; Chigona et al., 2014:5). Participant S1/T1 indicated that a teacher assisted them with technical difficulties. Participant S3/T3 assisted the teachers at his school (see also 5.4.2.2). Research suggests that most schools rely on computer teachers who are skilled and who know computers well because they have an interest in technology (Mahlo & Waghid, 2022; Hadijah & Shalawati, 2017:308).

Participant S3/T2 elaborated on the technical problems in the following manner:

> *"I would say technical compatibility, challenges. Sometimes, our laptops are outdated; we have the internet, it's buffering, speed is not up to standard. So, we have... the school doesn't have the necessary resources to buy new ones with extensions, beamers for bandwidth speed are becoming a problem because if everyone is sharing the same speed, then we have a slow connection and as well also the outdated laptops, programmes we don't have funding to buy these licenses and other challenges we face is also the time we have to set up the computer laptop screen was a projector" (*S3/T2).

The responses also show that principals are lacking in terms of supporting teachers with the needed equipment:

> *“Like Teacher 1 was saying, the principal should at least ensure for us to use those computers, because they are there, they are not working. So, at least once a week, we can take our learners into the computer room. Just doing Mathematics or spelling in English. They can do spelling”* (S2/T2).

If school technology were maintained and in good condition and schools could assign an IT technician, ICT implementation in schools could be appropriately achieved (Razak et al., 2019:189). The findings show that high-ranking quintile schools’ (6, 7, 8, and 9) teachers have access to technical assistance, although some express concern that the workload is too significant for one individual.

> *“Well, we have one that can help us, one IT, if he's available if I have a problem now and I asked him it's not that he can come now, he may be busy, the computer class or whatever so, it's not, you must have patience sometimes. Sometimes it takes days before he can help us”* (S6/T1).

> *“Ons het nou ons tegnikus, daar moet meer 'n los kandidaat wees wat meer kan help met, soos programmetjies op die rekenaars, wys my 'n nuwe skill. Dat mens kan rond beweeg en omgaan want ons onderwysers kom ook nie by mekaar uit nie”* (S9/T2).

> [We now have our technician, there should be more of a free person who can help more with, like programmes on the computers, or show me a new skill. That a person can move around and go around because our teachers don't get together with each other either.]

The findings about ICT technical issues show that principals are not devoting sufficient time and effort to ensure support to teachers regarding technical issues. It is suspected that principals lack the time and skills to address this. It is also possible that schools cannot afford a technician and do not budget for it.

5.4.2.4 Theme: 1.2.4: Teacher training

The principals of quintile 4-5 schools created training opportunities for their teachers to improve their ICT skills. Participant S6/P for example, claimed that before the COVID-19 pandemic, teachers received regular training on Fridays for teachers who were struggling. In the same vein, participant S7/P also indicated that teachers had regular developmental training, but due to their weak network system they were experiencing problems. According to Alenezi (2019:225), inadequate network

connectivity hinders educators from utilising educational technology, necessitating continuous maintenance and ICT support services to facilitate efficient implementation in schools. Participant S9/P even claimed that his teachers did not really need development because they were adept at using ICT tools.

> *Ek moet sê op hierdie stadium bitter min. Ek gaan nou met jou eerlik wees, dit voel vir my of ons personeel op so vlak is dat ons nie nodig het om gereeld opleiding te gee nie. (I have to say, very little at this stage. I'm going to be honest with you now, it feels to me as if our staff is at such a level that we don't need to provide regular training (S9/P).*

It is suggested however by Johnson et al. (2016:2) that teachers won't be able to fully utilise new technologies without adequate professional development. Given the situation, the leaders should make use of situational leadership which aims to develop teachers' ICT knowledge and skills. Teachers' professional skills must be developed to effectively implement ICT in teaching and learning, which goes beyond the use of only basic ICT skills (Nyongesa & Otieno, 2020:9). The situation in terms of teachers' skills is quite favourable at quintile 4 and 5 schools, on the other hand, as can be seen from the comments:

> *"We had training before COVID. We had on Fridays in the computer room …conducted a number of course, for the people who did struggle, and that was like before COVID. That's why I say, I don't think there's anyone who's really weak in using the computer because we are forced to use it"* (S6/P).

> *"Look, we have regular development sessions with them. … it's compulsory, yes, they had all that training. As I said that training, unfortunately, it didn't go very far. Because of an inherently weak system, it hasn't taken off the way it should have"* (S7/P).

5.4.3.5 Summary of the findings of category 1

In terms of knowledge and the use of technology (cf. 5.4.1.1), the study shows that principals from both quintile categories use technology daily. However, this is mainly for elementary and administrative purposes. Basic ICT skills, technical support, software, and hardware functionality for effectively implementing ICT in the classroom are not up to standard. Not all principals had received formal training in ICT usage. It seems that this is even more evident in quintile 1-3 schools (cf. 5.4.1.4). The data also

displays that most principals and teachers have a basic knowledge and skills level for the effective integration of ICT in teaching (cf. 5.4.1.5). The findings of the study, in terms of resource and organisational barriers in the implementation of ICT in schools, hamper effective implementation.

Furthermore, little guidance is provided that is aligned with policy requirements (cf. 5.4.2.1). The data displays that schools in the low quintiles (1-3) experience some severe challenges with ICT infrastructure, while schools in quintiles 4-5 experience fewer challenges in this regard (cf. 5.4.2.2). Teachers complained about the outdated and inefficient software, as well as poor security, in quintile 1-3 schools. This may be ascribed to the geographical location of these schools, being in neighbourhoods where poverty exists and due to insufficient funds to provide thorough security. Principals were found lacking when it came to leading and managing these challenges. Van Deventer (2016:125-126) states that this process should be part of leading, directing, controlling, and correcting management tasks. This should include the processes of communication and supervision, as well as the implementation of corrective measures. The challenges may be ascribed to schools in affluent suburbs and poor areas facing a digital divide in South Africa (Chisango & Marongwe, 2021:151). Lack of technical support is a challenge in quintile 1-3 schools (cf. 5.4.2.3), while such support is generally better in quintile 4-5 schools.

5.4.4 Category 2: Experiences of teachers in terms of ICT Implementation and support

The findings under this theme align with research questions 3 and 4: principals' leadership and management duties in ICT implementation. Any strategy to improve ICT implementation should be based on how it manifests in the classroom. Teachers' experiences on how they perceive ICT implementation and support from principals are vital, as they will pave the way for a deeper understanding of what type of support is desired from principals.

5.4.4.1 Theme 2.1.1: The value of ICT in instruction

Teachers in low quintile schools referred to the importance of ICT in curriculum and teaching. The participants alluded to the fact that the curriculum keeps changing. They also referred to the impact that COVID-19 had on curriculum delivery.

> *"Yes, because there's less paperwork in ICT. It's vital because curriculum is not something that stays the same. Curriculum change and ICT, fortunately in all the changes that the curriculum is changing. Remember, with COVID, I mean, all the other learning areas had to be cut or trimmed to fit within the space. And all the lessons and whatever were based on ICT. Every lesson was given through an ICT medium of instruction"* (S1/T4).

The feedback above is a sign that principals should be able to act as change agents to respond to curriculum change. The challenges brought forth by the COVID-19 pandemic also got opportunities to improve online learning skills. In this vein, Mukute et al. (2020:1) support the premise that a silver lining to COVID-19 was the development of educational innovations. Principals should be able to manage these changes and provide leadership in online methodologies. Ersozlu, Karakus, Karakas and Clouder (2024) agree that for a principal, as an instructional leader, embracing educational innovations is crucial in navigating the changes in the academic landscape.

The participants pointed out that learning with ICT is more exciting, making the work easier for learners:

> "*And also, with ICT, they become more interested because they are now excited to see what is going to happen. Unlike you just talking. With the ICT, you expose them to certain types of the world, certain areas of the world. And you, as the educator, you get their attention"* (S1/T5).

Prasanthi and Rajani (2022: 4233) agree that with the advancements in technology today, audiovisual training has become more accessible. It is now possible for learners to use computers for a variety of purposes in their education. This feedback is a stern reminder to principals to be on par with technological developments to improve instruction. Using technology to enhance education instruction, transformational leaders should empower educators, encourage teamwork, support creativity, and uphold equity, all of which result in dynamic, stimulating learning environments for students (Kareem, Patrick, Prabakaran, Tantia, MPM & Mukherjee, 2023).

The data further shows that teachers from quintile 4-5 schools also acknowledge the importance of ICT implementation with statements such as:

> *"ICT prepares learners for the future"* (S6/T5), *"ICT makes the administrative work easier, such as capturing of marks"* (S9/T6).

Henderson (2020:52) adds that using technology to teach the same concepts in a new way can encourage more active participation in the learning process than in a traditional lecturing environment. Principals should understand how to perform this task to respond to the need to improve administrative functions through ICT (Avidov-Ungar & Hanin-Itzak, 2019). The issue of inequalities in the different quintile categories was also highlighted: *S6/T:*

> *"I think you can see a huge difference between a school that has got the money and the means to teach with ICT and a school that does not use it at all. I think."*

By creating well-resourced ICT spaces in schools, principals, as transformative leaders, may promote creativity, enhance instructional strategies, and prepare students for success in a technologically advanced world (Cupido, 2022).

5.4.4.2 Theme 2.1.2: The utilisation and provisioning of ICT tools in instruction: The need for principals to understand ICT tools

The findings alluded that some teachers in the quintile 1-3 schools readily use ICT tools for instruction. The ICT tools used are interactive whiteboards, laptops, tablets, data projectors and computers (in computer laboratories). Based on the researchers' observations, it is also evident that teachers in schools in quintiles 1-3 are adopting technology as a teaching tool to establish interactive and captivating learning environments for their pupils. Smartphones seem to be a popular device:

> *"I'm also responsible for arts and culture, or creative arts, and what I normally do is, on my cell phone, I search for projects and things like that, and then give the learners ideas because most of them do have access to phones"* (S5/T3).

Some participants' feedback illustrates that some advanced forms of ICT tools are utilised for various purposes, such as uploading questions, question papers, YouTube videos, or IBS videos on the smartboard. However, in other cases, that is not the case. The statement below bears evidence of the mixed responses in terms of ICT implementation:

> *"We have introduced a coding and robotics class where we need to implement or use ICT. So, in our coding and robotics we're making use of laptops and projectors, as well as a screen. But in the normal everyday teaching, the teaching setup, we're not really using any ICT"* (S5/T1).

The value of integration of ICT tools is pointed out by Makgati and Awolusi (2019:48), who claim that "integrating ICT into education can improve pedagogy". As the instructional leader, the principal should be familiar with the use of information technology resources for teaching, learning, and assessment (DBE, 2016:13). The data from the interviews reveals that other usages of ICT tools include conducting research and using it in the instruction of various subjects such as Afrikaans, English, Sesotho, Tswana, Geography, Technology, and Arts and Culture. There is, however, evidence of poor utilisation of the process. Participant S1/T2, for instance, revealed that learners work on tablets in some subjects in the computer room. While observing classroom practices, the researcher found poor utilisation of classroom practices, highlighting the need for proper training and support for teachers and learners from principals (as Instructional leaders) to ensure that ICT tools are used effectively.

The data shows that teachers in quintile 4-5 schools use ICT tools for the same reasons that their colleagues do in quintile 1-3 schools. For example, the teachers at these schools (S6/T4, S7/T2, S6/T2, S7/T2) also use technology such as videos to help their learners understand concepts and even sometimes as a motivational tool. One of the teachers elaborated as follows:

> *"I teach Technology. So, some of the concepts are hard. So, when you show a video, it helps them to understand it, to some extent, and then it motivates them to, if they don't understand something, to actually go and look on YouTube or on the internet for something, and not just rely on my knowledge"* (S6/T2).

Technology for education improves motivation, recall, new instruction stimuli, activating responses, receiving systematic and steady feedback, practising appropriately, sequencing learning, and locating viable sources of information. Teachers can cultivate in learners a positive attitude toward information technology tools in their daily lives (Enu et al., 2018:36). The findings from the study show that the teachers in the high-ranking quintile schools utilise technology for various approaches in vital subjects such as Mathematics and Geography. These practices were confirmed during the observation of lessons.

“Ja, die witborde. Soos al die funksies, in Wiskunde gebruik jy dit baie en ook op die witbord is daar baie interaktiewe speletjies, Wiskundig wat jy kan speel, en dan ek gebruik soms die selfone wat dan hulle die fotos kan stuur na die bord toe, as mens goed wil afneem” (*S7/T2*).

[Yes, the whiteboards. Like all the functions, in Mathematics you use it a lot, and also on the whiteboard there are many interactive games, Mathematical, that you can play, and then I sometimes use the mobile phones which they can then send the photos to the board if you want to take photos of things.]

“Yes, ons gebruik ook nogal baie PowerPoints op die rekenaar, heel moontlik, en dan die witbord is lekker, want soos as met SW, dan gebruik ons Google Earth, dan kan jy nou die aardbol sien, en jy kan op die bord mos nou beweeg dan trek jy hom groter en dan wys jy hulle nou waar die kontinente sit. Want die kinders, Graad 4 en op, eintlik al die kinders deesdae, is baie meer visueel gestimuleer. As hulle 'n prentjie kan sien onthou hulle dit, en dan het die Wiskunde juffrou my geleer van speletjies ook wat hulle daar kan kry” (S7/T3).

[Yes, we also use quite a lot of PowerPoints on the computer, quite likely, and then the whiteboard is nice because, as with SW, then we use Google Earth, so you can see the globe, and you can move on the board, and then you draw it bigger, and then you show them where the continents are. Because the children, Grade 4 and up, actually all the children these days, are much more visually stimulated. If they can see a picture, they remember it, and then the Maths teacher taught me about games they can also find there.]

The feedback above clearly indicates that using ICT tools in lessons is well developed at quintiles 4-5 schools. The evidence of many available ICT tools in lessons bears testimony of good instructional leadership practices, whereby principals emphasise using ICT tools. Principals should provide continuous professional development sessions, such as training and coaching, to help teachers develop and refine their ICT skills. It is also possible that principals have regular discussions (even informally) that emphasise using ICT tools and assist with integrating these. In the observations, in higher-ranking quintile schools, the presence and utilisation of ICT tools in lessons strongly indicate well-developed practices in incorporating technology into education. The abundance of available ICT tools in these schools is a testament to school principals' emphasis on technology integration, reflecting effective instructional leadership practices. Table 5.4 provides a summary of ICT tools usage.

Table 5.4: A summary of the usage of ICT tools

ICT Tool	Usage	Subjects
Interactive whiteboard (Smartboard) Computers – PC, laptop Cell phone Speakers Chromebook	PowerPoint presentations Videos Google Earth Pictures YouTube videos Songs Research Counting Games	Mathematics Natural Science Technology Languages Geography Social Science

5.4.4.3 Theme 2.1.3: Principals' role in enhancing collaboration among teachers

It seems from the responses of all the quintile 1-3 schools that most teachers collaborate to support one other with ICT-related issues. During the observation of lessons in the computer laboratory, it was evident that teachers were actively engaging with each other to troubleshoot technical problems, share resources, and exchange ideas on how to integrate technology effectively into their teaching practices. The feedback from one of the principals attested to this support by shared leadership and delegation:

> *"I would say yes because they really do help each other. If I get stuck with something, I can just call somebody, some teacher, and they are really willing to help and assist one another. And myself included. Like, teacher X, she would come and assist"* (S5/P).

As a response to the question of whether skilled ICT teachers support less experienced teachers, the following responses were provided.

> *"Mr X is playing a huge role"* (S1/P).
>
> *"It's only Mr Y, and I would say Mr Y and his team"* (S3/P).
>
> *"Not at all"* (S4/P).

From the responses, it can be deduced that apart from support from knowledgeable teachers, ICT committee members assist less skilled teachers, according to participant S3/P. The value of this collaborative approach is supported by studies that have shown that teachers who innovate in pedagogy, train their peers, and challenge traditional teacher roles most effectively use ICT (Hadjithoma & Karagiorgi, 2009). In this study, it was impossible to establish if the collaboration and support among teachers was

because of a purposeful strategy by their principals. Transformative leaders encourage collaboration and problem-solving among teachers by fostering innovation and reflection, enabling them to utilise ICT (Yamamoto & Yamaguchi, 2019:48) effectively.

From the responses of participants from quintile 4-5 schools, it seems that less skilled teachers also receive assistance when they struggle to integrate technology into their classrooms. Participant S6/P confirmed this and added that the school also provides training on Fridays, which may be described as an example of good professional development. This finding contradicts a previous study by Zeng et al. (2018), who points out that a lack of professional development opportunities is one of the common factors responsible for the hindrance of ICT integration in public schools globally. Similarly, participants S7/P, S8/P, and S9/P also confirmed that teachers who struggle with ICT integration receive assistance from skilled teachers. The excerpts below bear this out:

> *"I think so. Especially, as I say, in previous years when we now had those Friday lessons and so on. There are quite skilled people who do assist or did assist. But as I said, I think now everyone is quite well trained"* (S6/P).
>
> *"Yes, they support where the need arises. So, X (DH), for instance, if the teachers in her section say, we're battling with this, you know we can't use our projectors for that because this is now not working and it's not syncing. Then, she would assist. But she would probably tell them to call XXX"* (S7/P).
>
> *"Ja, hulle help mekaar, ja. Die jonges help nogals die oues"* (S8/P).
>
> [Yes, they help each other, yes. The young also help the old.]
>
> *"Ja, daar is"* (S9/P).
>
> [Yes, there is.]

Principals as instructional leaders play a crucial role in encouraging collaboration among teachers in implementing ICT in schools by developing a common vision (Ugur & Koç, 2019).

5.4.4.4 Theme 2.1.4: The need for ICT training

When implementing ICT in schools, there is always room for improvement, another essential characteristic of transformational leaders (Baroudi, 2022). Teachers must adopt new technologies as ICT evolves to improve their teaching methods. As the Standard (DBE, 2015:13) states, a school principal should know research and practice-derived evidence to enhance teaching and learning. Teachers at quintile 1-3 and quintile 4-5 schools concur that there is still room for development regarding ICT integration. According to the PAM (2015:33), the principal is in charge of creating and carrying out educational goals that align with the school's requirements. The training of teachers is one of the areas that still needs improvement, as pointed out by five teachers (S1/T2, S9/T1, S2/T3, S3/T1, S3/T3, and S6/T1) from both quintile 1-3 and quintile 4-5 schools. The documentary analysis confirmed this, as the researcher could not find evidence of planned training sessions for ICT improvement. The excerpts below are a demonstration of this need:

> *"Teacher training. ICT development within teaching and learning. And the knowledge of combining or integrating this into each lesson"* (S1/T2).

> *"Yes, I agree with my colleagues, but also to add on top of that. Also, teachersare supposed to be trained because what is the use we take the learners to the lab after the teacher can't even open that computer or laptop? So, I think also the teachers should be trained"* (S2/T3).

Johnson et al. (2016:8) recommend that principals develop professional learning communities led by master teachers who successfully implement educational technologies. Instructional leaders should offer ongoing professional development opportunities for teachers to effectively use ICT in the classroom, emphasising practical techniques and abilities (Fuad et al., 2022).

5.4.5 Category 2.2: Principals views on their roles in ICT-implementation

The findings under this category are aligned with research question 2, which is directly associated with the role of principals in ICT implementation. This theme focuses on the knowledge and capabilities of teachers' ICT skills and the principal's role in addressing identified weaknesses amongst staff. The section concentrates also on measures principals take to motivate/encourage teachers to use ICT in their

instructional practices. This is followed by the principal's approaches to effective ICT implementation and the role of the rest of the SMT.

5.4.5.1 Theme 2.2.1: Teachers' ICT capabilities

Principals of the quintile 1-3 schools reported that a few teachers, especially the younger ones in their schools, possess excellent ICT skills. This is evident in the following remark:

> *"Yeah, as I just pointed out, the knowledge of the educators, especially the young educators, if I could, I would say the knowledge here is about 50% of the teachers are really... They know their business when it comes to ICT"* (S5/P).

Cases of insufficient expertise are also evident in the data, as indicated by the feedback above, as well as from the responses from some participants: *"I have only two teachers that I can say they're at a standard level. There's no one that is, how can I say this... That is outstanding. No one" (S4/P).* This situation emphasises the need for pre-service and in-service ICT training (Mwila, 2018:228). Concerning, though, is that principals seem to be unable to provide sound guidance to address this challenge by using force to obtain ICT implementation:

> *"I have young teachers, two young teachers who don't like computers; they use them because I force them to use them. I don't know, their attitude towards computers is not that good because, …Those who are good are good. That is the strength, and those who are good are using it effectively"* (S1/P).

Using force is not a characteristic of either transformational or instructional leadership. Transformational leaders inspire and motivate followers, and instructional leaders support and empower teachers to improve their teaching practices (Musa, Nazarudin, Noordin, Juati & Juhumin, 2020). Using force can be counterproductive, as it may damage relationships (Szostek, 2019).

The data also reveals that challenges such as a lack of planning, lack of enthusiasm, and negative attitudes towards ICT were evident amongst some of the teachers. According to Mensah and Osman (2022:115) and Razzak (2013:3), teachers hesitate to adopt and use technology because of computer anxiety. This may promote the digital divide. Instructional and transformative leadership are crucial in implementing ICT in schools, fostering innovation, creating a supportive environment, focusing on

learners, using data-driven decision-making, and promoting continuous improvement (Burić et al., 2021:192). The findings showed that principals do not know how to address the weaknesses pointed out:

> *"I don't know even how can I [sic] identify that"* (S4/P).

> *"As I said, their weaknesses might be there... We have one computer room and I mean we have a lot of educators. So, their weakness, the planning around taking the learners, the effort that they must put in, that can be seen as a weakness of the educator. They are not enthusiastic in terms of presenting the lesson in such a way that they force themselves to go to the computer and teach through the computer"* (S5/P).

The responsibility for implementing ICT tools in classrooms rests with teachers. Still, principals should ensure that this is done through supervision practices, which are vital to principals' instructional leadership duties (Maponya, 2020).

In comparison, most teachers in the quintile 4-5 schools (S6/P, S7/P, S8/P and S9/P) are comfortable using ICT tools in their classrooms. Compared to remote rural teachers, urban teachers were more open to the use of ICT (Wu et al., 2022). The data discloses that younger teachers are more proficient in the use of technology but that the degree of computer literacy varies. During the observation, it was noted that younger teachers demonstrated a higher level of comfort and familiarity with technology than their older counterparts. Younger generation teachers are more confident and do not require as much support as their older counterparts do (Umugiraneza et al., 2018:11). This notion is supported in the following remark by one of the participants:

> *"As ek dit in persentasie kan uitdruk, dink ek ons het die laaste 5 jaar, met 'n personeel van 40, het ons omtrent 50% van ons personeel is nuwe mense, wat almal jong, opgeleide mense is met meer computer skills as die ouer generasie.*
>
> [If I can express it in a percentage, I think we have in the last five years, with a staff of 40, we have about 50% of our staff being new people, who are all young, educated people with more computer skills than the older generation.] (S9/P).

In the opinion of participant S6/P, younger teachers are generally more open to new developments.

> *"Well, I think the strengths are that they… Because this is quite a young staff, they've been more open to, we don't have these old fossils that are like, I'm not doing it. So, they're more open. I think that's their strength; they've been open to accepting it and developing themselves"* (S6/P).

Raj (2017:266) points out that older teachers and those living in remote areas are less likely to use new technology due to their limited exposure. Participant S8/P claimed that teachers are skilled in ICT and everyone can type question papers, capture marks, etc. Teachers can access applications like Word and Excel, but some have more expertise in these areas. Although teachers know how to use computers, they lack the confidence to use online platforms. This finding is confirmed by Chisango et al. (2020:4), who claim that although teachers are ICT trained, they still fear making "technical mistakes" in class. Several teachers are concerned about using Zoom as a presentation platform and recording virtual lessons.

> *"Ek sal nie sê daar is regtig weaknesses nie, ek dink party mense het net min selfvertroue om by voorbeeld Zoom te gebruik om hulself op te neem, om les aanbiedings te doen, daar kort 'n bietjie selfvertroue, maar die knowledge om dit te doen, dink ek, is daar"* (S9/P).
>
> [I wouldn't say there are really weaknesses. I think some people just lack confidence to use, for example, Zoom to record themselves, to do lesson presentations, there is a little lack of confidence, but the knowledge to do it, I think, is there.]

5.4.5.2 Theme 2.2.2: Addressing limitations of staff in terms of ICT skills through professional development

In response to the question of how principals address the limitations of the staff in terms of information technology skills, principals who serve teachers in quintile 1-3 schools confirmed that they were not taking much action. Hence Prasojo, Habibi, Yaakob, Mukminin, Haswindy & Sofwan (2019:8) state that school principals should work with staff to develop short- and long-term ICT integration plans that align with the transformational theory. Principals (e.g., S3/P) responded that they used the younger, more skilled teachers to assist the teachers with difficulties. This can be regarded as the practice of delegation or the distributed leadership approach, which focuses on dedicated teachers as a valuable resource for school leaders seeking to implement innovative ICT practices (Ottestad, 2018:109). According to the requirements of the

PAM document (2022:33), the principal as an instructional leader should guide, supervise, and provide professional advice about the work and performance of the entire staff in the school, which forms part of the instructional leadership role. The data displays, however, that school principals are not always addressing possible challenges and rectifying those, as displayed also by the following two comments:

> *"At the moment, I must be honest, I just recently asked the Departmental Head that we've got computers, let them be the ones that are to be used because they cannot be white elephants. Maybe it is a question of the timetable that has to be implemented. But that is what I've asked; maybe one has to do more in encouraging them also to be familiar with the new changes"* (S2/P).

> *"At this stage, to be honest – not much. Yes, we discussed it in SMT meetings, but there's where it stays"* (S5/P).

The data from the documentary analysis confirmed this finding. There was no evidence of professional development strategies or vision and mission statements for ICT implementation in the schools that presented their ICT policies. These are crucial aspects of the instructional leadership theory (DBE, 2015). The principals of quintile 4-5 schools created training opportunities for their teachers to improve their ICT skills. Participant S6/P, for example, claimed that before the COVID-19 pandemic, teachers received regular training on Fridays for struggling teachers. This was confirmed by the evidence presented in the documentary analysis that teachers receive ICT integrating training. This is a sign of the professional development associated with instructional leaders. Participant S9/P even claimed that his teachers did not need development because they were adept at using ICT tools.

> *"Ek moet sê op hierdie stadium bitter min. Ek gaan nou met jou eerlik wees, dit voel vir my of ons personeel op so vlak is dat ons nie nodig het om gereeld opleiding te gee nie"* (S9/P).

> [I have to say, very little at this stage. I'm going to be honest with you now: it feels to me as if our staff is at such a level that we don't need to provide regular training.]

However, Johnson et al. (2016:2) suggest that teachers won't be able to utilise new technologies without adequate professional development fully. Teachers' professional skills must be developed to effectively implement ICT in teaching and learning, which goes beyond the use of only basic ICT skills (Rubach & Lazarides, 2021). The situation in terms of the development of teachers' skills – which forms one of the core duties of

the instructional leader (Sharif, 2020) – is quite favourable at other quintile 4 and 5 schools as well, as can be seen from the comments:

> *"We had training before COVID. We had, on Fridays in the computer room …conducted a number of courses for the people who did struggle, and that was like before COVID. That's why I say, I don't think there's anyone who's really weak in using the computer because we are forced to use it"* (S6/P).
>
> *"Look, we have regular development sessions with them. … it's compulsory, yes, they had all that training as I said, that training, unfortunately, it didn't go very far. Because of an inherently weak system, it hasn't taken off the way it should have"* (S7/P).
>
> *"As daar kursesse aangebied word, dan vra ons vir personeel, wie wil betrokke wees, ons begroot ook daarvoor. As mense wil, om enige ontwikkelingskurses te doen, maar dit berus ook maar by die personeel self om te besluit, wil ek nog verder verryk. Ons bied dit aan. Ons stel dit beskikbaar"* (S8/P).
>
> [If there are courses offered, then we ask for staff who want to be involved; we also budget for that. If people want to do any development courses, but it is also up to the staff themselves to decide, I want to be further enriched. We offer this. We make it available.]

This finding was supported by evidence from the documentary analysis, which indicates that ICT training is available for interested teachers. This approach – providing the participants the opportunity to decide for themselves – is very much in line with the transformational approach. According to Afzal et al. (2023:3), transformational leaders believe in fostering a sense of fulfilment and motivation among followers, promoting increased performance and organisational involvement through respect and workplace participation.

5.4.5.3 Theme 2.2.3: Strategies to encourage and motivate teachers

The data shows that most principals in quintile 1-3 schools admit not motivating or encouraging teachers to use ICT in the classroom. The data indicates that most principals in schools categorised in quintiles 1-3 acknowledge a lack of motivation and encouragement toward teachers to incorporate ICT in their instructional practices. This approach contradicts what the transformative leadership approach entails, which is

that encouragement is vital in this approach (cf.3.2.3.1-i). The lack of motivation is evident in the following remarks by principals:

> *"At this moment, no, I did not do anything to that one, but because maybe with the new routers that we've been given, it will be of great use that we can, can now embark on that encouragement and also motivating the teachers to make use of it"* (S2/P).

> *"I really... I can't say how I motivate them … As a principal, I think I could motivate them. But in this case, from the principal's side, less on motivation"* (S5/P).

The ability and willingness of teachers to integrate and implement ICTs into their teaching will largely depend on the encouragement of principals. Bellibaş et al. (2021) claim that this approach forms part of the transformational leadership approach, which fosters collaboration and problem-solving by creating conditions that allow teachers to work toward improvement without explicit direction. One of the principals, S3/P, typically relied upon the DoE to arrange ICT training, which she usually allowed teachers to attend. It seems, though, that teachers are not very eager to participate in the sessions:

> *"Normally, when we get invitations from the department, I normally send the relevant people, but you know, sometimes it's always the same people that are willing to go"* (S3/P).

There may be several reasons for the lack of motivation, such as time or interest. It is also possible that teachers may not receive enough support or encouragement. Teachers may also experience burnout, especially in today's challenging educational environment. A hallmark of the transformational leadership theory is the focus on motivation and organisational involvement that will be suitable in addressing ICT implementation (Dexter & Richardson, 2020:24). On the other hand, principals in quintile 4-5 schools experience fewer challenges with teacher motivation to use ICT in their lessons. Motivation for ICT implementation appears to be intrinsic according to (S7/P):

> *"I think the motivation comes from them. They want to use it in their offering because they'll see a colleague is using that, ... It very much depends on the individual teacher. And you know, we try to equip them and try to spread the word about it*."

An innovative and convenient ICT practice that allows parents and learners to access lessons online through the school's website was found at school 6, where the principal

indicated that the school had a website on which parents and learners could access lessons. This modern approach enhances more accessible communication and collaboration between teachers, students, and parents, ultimately improving the learning experience:

> *"So, we do encourage them. There are also teachers who use YouTube videos in their… especially in the science classes, we encourage that and we actually – on our website – not the website on the Facebook. We actually put a few of those lessons so that the parents can see what some of them do in those specific natural science classes"* (S6/P).

The findings also demonstrate some good collaboration practices amongst staff promoted by the visionary leadership of principals. Instructional leaders rely strongly on sound vision to improve instruction (Ramasimu, 2023:52). The principal at School 8, for example, alluded to this as well as to the effort made by the entire SMT to ensure that the staff implemented ICT at the school:

> *"... met ons beplanning, met ons SMT begin het met dit, het ons gesê dit is ons projek wat ons wil aanpak. Ons wil graag borde in al die klasse sit, en al die personeel het ingekoop daarop. So, almal is entoesiasties, en om te sien hoe die kinders dit geniet en ook nie net dit geniet nie, maar ook om hulle akademie daardeur te verbeter"* (S8/P).
>
> [… with our planning, with our SMT beginning with this, we said this is our project that we want to undertake. We really want to put boards in all of the classrooms, and all of the staff have bought into that. So, everyone is enthusiastic, and to see how the children enjoy it and not only enjoy it but also to improve their academics through it.]

Apsorn et al. (2019:644) discuss how school leadership develops a vision and inspires others. Having a vision forms part of the instructional leadership theory. Undoubtedly, psychology plays an essential role in employee morale, staff job satisfaction, effective participation, motivation, organisational commitment, organisational support, and subordinate-leader relationships. The transformational leadership approach may spark enormously improved behaviours and performance in ICT implementation in schools (Okeke, 2019:52). As explained by participant S1/P, she did not compel teachers to attend workshops with the Department of Basic Education but did encourage them to do so.

> *"I don't force them but, I encourage them always to attend the workshops because, Mr X (DBE) – when you attend Mr X's training programmes, you will be motivated to use*

it in class. I think that's where my motivation mostly came from because, his attitude in his workshops is helping a person in being willing to use what he teaches you" (S1/P).

The study also revealed some other strategies principals use to motivate teachers to use ICT in the classroom. Participant S8/P requested the school fund teacher training in ICT. Transformational leadership approaches foster an environment that is supportive of teachers and conducive to effective performance in ICT implementation (Mngadi, 2021:48). ICT improves teachers' work efficiency, as stated by participant S6/P.

"So, I think they realise at this stage it makes your work easier. And you can do more with a computer than just simply with a textbook for instance" (S6/P).

"The thing is, you've got to allow teachers to – some love using technology, and we let them fly with it. We try to equip them and try to spread the word about it" (S7/P).

5.4.5.4 Theme 2.4.4: Leadership approaches of the principal for effective ICT Implementation

The findings of this study show that principals in quintile 1-3 schools realised some responsibility as instructional and transformational leaders. They (S1/P, S3/P, S5 and S6/P) understand that they must motivate and encourage teachers to use ICT in classrooms. It was interesting to note that teachers, especially the younger ones, have a positive attitude toward ICT implementation, as is evidenced by the following excerpt:

"My role is just to motivate them. I can't say I can force them, but I mean, if we have, especially our youngsters, they're always willing to do things. So, with them, there's no way that you will force them they follow instructions" (S3/P).

There are many possible explanations for why younger teachers embrace technology. One may be that the younger generation has grown up with technology, making them more comfortable and familiar with it daily. They are more exposed to technology in their teacher education programmes than older teachers who may not have received training in this area (Mashonganyika & Marevesa, 2022). Therefore, principals must address this challenge of older teachers who resist embracing new technologies (see 5.4.5).

The responses to which leadership style they used for ICT implementation varied significantly. The participants used various leadership styles: situational (S2/P), autocratic, and instructional leadership (S4/P). For S2/P and S5/P, it was all about supporting teachers. This leadership approach aligns with what Karakose et al. (2021) suggest, that a school's ICT leadership, the required infrastructure and a comfortable working environment are crucial for fostering digitally literate learners. The excerpt below bears evidence of the supportive approach by some principals:

> *"One, I must give support. Two, I must, of course provide instruction, with the SGB and encourage people to make use of them to the benefit of kids. And if there are some developments and training that teachers must undergo, then we need to allow them to go for such kind of training"* (S2/P).

The data shows a need for more support from education authorities:

> *"And we need to change and adapt in terms of our teaching and our learning… And as principals, you should take the leading role. It's just, as a principal, I would need much more support and intervention from the departmental side"* (S5/P).

It may indicate that principals do not understand how to provide leadership with ICT implementation. This is confirmed by previous research that educational technology challenges stem from inadequate preparation by school principals, who often lack knowledge, experience, and expertise in media and information technology (Apsorn et al., 2019:641).

Principals at the quintile 4-5 schools expressed similar views, with principals claiming that they use ICT for enhanced academic offerings and to promote the use of ICT in the school (S7/P; S8/P). It was interesting to note that none of the principals pinpointed specific leadership approaches to enhance ICT implementation. This is evident from the vague feedback provided by S8/P:

> "*Ek dink dis belangrik dat 'n mens ICT moet bevorder by jou skool, want dit is die toekoms..."*
>
> [I think it is important that you promote ICT at your school because it is the future.]

The data further shows that principals value collaboration with other schools and regular interaction with teachers to ensure sufficient ICT implementation. This approach aligns with the instructional leadership theory, which highlights communication as a critical strategy to keep staff informed, engaged and prepared for

changes in ICT implementation (Groenewald et al., 2024:435). It is also essential for the school to establish good relationships and collaboration with secondary schools where their students will be enrolled:

> *"Ek dink, wat ek sal wil hê van so 'n leier is, moet gereeld met die personeel praat, punt nommer 1. Punt nommer 2, hulle inlig as daar nuwe verwikkelinge of nuwe ontdekkings of nuwe programme uitkom, wat van toepassing is veral op laerskole. …daar moet goeie verhouding gebou word met hoërskole waarnatoe ons laerskool kinders gaan"* (S9/P).
>
> *[I think, what I would like from such a leader is to talk to the staff regularly, point number 1. Point number 2, inform them if there are new developments or new discoveries or new programmes coming out, which apply especially to primary schools… that a good relationship must be built with secondary schools to which our primary school children go.]*

5.4.5.5 Theme 2.4.5: Leadership roles of SMT members

In response to the question requesting participants to explain the role of SMT members in providing leadership in ICT, it seems that they perform an insignificant role in low-quintile environments. This creates the impression that no leadership roles are being assigned to SMT members in terms of ICT implementation. Teachers also pointed out that SMT members should be trained to provide sufficient support to teachers. According to Hamzah et al. (2021), they should be taught to lead digital development in their school and to spread this practice to the school learning environment. Various teachers also questioned principals' bona fides in terms of support to them.

> *"That's what I'm saying, we just need support. If we get more support, because I know that my DH, she is responsible for the computer lab. I think if she gets the necessary support, the workshop, and the training. Then it will make it easier for them to actually make the facilities workable"* (S2/T6).

This contradicts what the Standard (2016) and other literature suggest, and that is that principals should use distributed (Instructional) leadership practices. School leaders may not be experts in ICT use, but ICT staff can facilitate and set directions for teachers and staff. Seeking guidance is reasonable when making ICT decisions (Apsorn et al., 2019:640-641). The data reveals that the SMT does not display sound

leadership practices regarding ICT implementation. Leadership practices revolve mainly around allowing teachers to conduct presentations with ICT tools once a term or vague responses about involvement (S5P). This is evident in the feedback from one of the principals:

> *"We don't encourage them that much verbally, except that saying to them, here are the gadgets, use them, attend workshops. But we never initiate, except during their accountability sessions. After every term, once a term, we have accountability sessions, where they have to present their stuff. That's the only time that we force them to use"* (S1/P).

The findings demonstrate that SMT members are sometimes even substituted by others. The principal of School 5, for example, made the following insightful comment about the extra staff that play a role in ICT implementation:

> *"They should play a role, but it's not effectively happening because the department also employ these EAs - Education Assistants, and three were allocated for ICT. And the reason why I'm saying they are not fully being utilised or used is because, we use them now for other things to do instead of focusing on the ICT. So, in a way, we are not managing, as an SMT, that correctly"* (S5/P).

> *"It seems though that training for SMTs is high on the agenda for teachers. "Yeah, I think most of them, basically training, training, training"* (S3/P).

The findings demonstrate similarities at quintile 4-5 schools. It seems that principals and SMTs fail to understand that the leadership role they should play is far more comprehensive supervision than what they perceive. Leadership appears to be regarded as a mere informal oversight role:

> *"No, I can't say formally that they do. Informally, those who are better at ICT would help colleagues in their section with a certain way of using their device in a certain lesson. But it's more on a case-to-case basis. So, there isn't an SMT member who is charged with doing that. So, it's not a formal duty of any SMT members to do that"* (S7/P).

Although the principal at the school mentioned the issue of class visits, it seems that this was not done according to any specified criteria or programme. This can be concluded from the remark below:

> *"Op hierdie stadium is dit net my twee, ek het 'n grondslagfase departementshoof wat ook optree as die akademiese hoof, en dan, soos ek vroeër genoem het, my*

Adjunkhoof wat by die seniors optree. So ek kanaliseer maar net die inligting na hulle toe, en dan word dit oorgedra na die personeel" (S9/P).

[At this stage, it is just the two of us. I have a foundation phase head of department who also acts as the academic head, and then, as I mentioned earlier, my Deputy Head who is busy with the seniors. So, I just channel the information to them, and then it's passed on to the staff.]

Continuous monitoring and evaluation are crucial for sustainable and practical improvements in ICT, requiring regular assessment of progress, stakeholder feedback, and adjustments based on performance data (Agboola, Bashir, Dodo, Mohamed & Alsadun, 2023).

Based on the reflections of the school principals in the quintile 4-5 schools, they could not pinpoint which instructional leadership tasks were performed by the SMT. Also, regarding duties such as assistance to department staff, one participant – S6/P – even though it was not the formal responsibility of the SMT members. Others, such as S8/P, viewed their oversight of ICT implementation as sufficient. In this school, the deputy principal and departmental head of the foundation phase were responsible for driving the school's ICT implementation process. There was, however, no evidence of concrete plans and approaches that relate to the required instructional (cf. 3.2.3.2) and transformational leadership (cf. 3.2.4.2) functions of principals. According to Van Greunen et al. (2021:3), schools must plan ICT implementation approaches, track progress, and use controlling processes. Rapid improvement requires regular evaluation. To ensure that school ICT programs support the school's ICT goals, a technology leader evaluates them (Okeke, 2019:54).

Interestingly, some principals did little to encourage their SMT members to take the lead in their different phases. For example, the principal of School 1 replied as follows when asked how he responds to the issue of encouragement of SMT members to take the lead in ICT implementation:

"I don't encourage them to encourage their subordinates. I do it myself. Maybe if I can teach them to say, encourage your teachers, then they will do it" (S1/P).

This comment suggests that the leader may view SMT members as responsible for encouraging their subordinates. Another possible reason is that the principal and the teachers may not have a good relationship. When principals fail to effectively empower

their SMT members with responsibilities, it can lead to missed opportunities for innovation, collaboration, and professional growth within the school community (Setlhodi, 2020). Transformational leaders foster peace and unity among followers, aligning their aims with corporate objectives (Fareed et al., 2023). The study shows that the SMT in quintile 4-5 schools supported ICT implementation but mentioned though that younger teachers often take the initiative (see also Bariu, Chun & Boudouaia, 2022:3). It is the school's policy to empower young teachers to take the lead:

> *"Yes, they're very willing to provide support, but then again, it doesn't really rest on the SMT because a junior teacher will stand up and say, listen, people, I'll help you. I'll explain this to you. And that's, that's how we work. We, we try to empower our young teachers"* (S7/P).

A Lack of support from the SMT was also evident from the responses at Schools 3, 4 and 5. This contrasts with the findings obtained at Schools 7 and 8, where teachers felt that they received sufficient support from the SMT. Interestingly, though, the teachers did not precisely indicate what the support entailed.

The data displays that principals rely very often on the expertise of teachers.

> *"There are definitely teachers that are excellent in that. Like the one, teacher X, she normally helps with the, when it comes to the end of the year. When we had to do promotion. Then she will be there exporting the one thing to another. To get the schedules ready for the department. So, I would say the management were allowed there, but they have expert teachers that know certain things, how to do it. So, they would rather assist us more as managers, in terms of that ICT"* (S5/P).

There is agreement among principals in quintile 4-5 schools that teachers are being assisted with the integration of ICT. For this reason, a person with the necessary IT skills should be ready to support. According to Ottestad (2018:109), dedicated teachers may be a valuable resource for school leaders seeking to implement innovative ICT practices. Once more, a knowledgeable person is essential in assisting struggling teachers.

> *"You see, let's say you are now busy working, and there's something that you don't understand, or something happens here, then you know who to call to come and assist you here. There are, as I said, knowledgeable people here apart from the IT person. Yeah, apart from that, just go come and help and see what's going on now"* (S6/P).

It seems that most schools do not have an effective functioning ICT committee. This was also confirmed in the analysis of the documents.

> *"No, we've got too many committees and stuff. We've probably, on paper somewhere, got an ICT committee because our teachers are spread very thinly, and there are committees and committees, and we've got a very small staff. So, no. We've got our IT guy, and we sync with him"* (S7/P).

The same situation is evident at S8, where an IT specialist supports struggling learners. An ICT committee is a crucial mechanism for fostering collaboration, guiding thoughtful technology integration, staying abreast of technological advancements, maximising resources, and ensuring that technology benefits all school community members (Tabowei, 2021).

5.4.5.6 Summary of the findings of category 2

The data in this study indicates that participants in both quintile categories recognised the importance of implementing ICT in schools (cf. 5.4.3.1). Due to the COVID-19 pandemic, teachers have become aware of the importance of integrating ICT into the classrooms. It is clear from the data analysis done for this study that teachers employ a variety of ICT tools and strategies and that participants use ICT in the classroom (cf. 5.4.3.2). This is a sign that principals and their SMTs, through instructional leadership practices, have created classroom environments in which ICT implementation can flourish. One of the most noteworthy findings in both quintile groups is the role that knowledgeable, skilful teachers play in leadership and support to their colleagues (5.4.3.3). This may be attributed to principals who delegate the responsibilities to teachers. However, the data has indicated that great strides have been made in ICT implementation; teachers, in particular, desire more training and professional development in ICT (5.4.3.4).

Based on the data, it is evident that teachers in schools in both quintile rankings have IT skills, although they are not at the same level (cf. 5.4.4.1). This necessitates training. The analysis shows that principals of schools in quintiles 4-5 arranged training sessions for their teachers in ICT to address their staff's weaknesses in information technology skills, whereas principals of schools in quintiles 1-3 did not do so (cf. 5.4.4.2). The principals' role in these schools to address weakness is through informal

delegation to younger teachers. Encouragement and developmental sessions form an important component of the approach, especially in quintile 4-5 schools. Good collaboration exists also amongst teachers at these schools, albeit not necessarily because of principals' interventions. At quintile 1-3 schools, principals seldom use encouragement and motivation to get staff going in ICT implementation (cf. 5.4.4.3). The section shows that there are no ICT professional development programmes for teachers run by principals in quintile 1-3 schools, underscoring the need for organised opportunities to improve digital literacy. The report also emphasises how crucial it is for instructors to have financial backing, encouragement, and support when integrating ICT in the classroom. While teachers in quintiles 4-5 reported receiving help from SMTs and administrators, teachers in schools S1, S2, S4, and S5 noted that they did not receive enough support from school officials. To guarantee that ICT is implemented successfully in classrooms, the study also emphasises the necessity of administrators and staff members working together and communicating effectively.

5.4.6 Category 3: Execution of management roles of principals in ICT implementation

The findings under this category are aligned with research question 3. In all aspects of the school's operations, including incorporating digital technologies into lesson plans, the managerial responsibilities of a principal are crucial (Kwatubana, 2023:188). This section also focuses on the principals' support for teachers in planning and integrating ICT in the classroom. This is followed by communicating the school's ICT goals and vision. The role of the SMT is also discussed.

5.4.6.1 Theme 3.1: Planning of ICT implementation

The feedback from principals on what type of strategies and goals they had for ICT implementation shows that this is lacking in low-quintile school environments. Strategy and goals form a crucial part of the planning phase of management (Sinnaiah et al., 2023:38; Van Deventer, 2016:125-126). It is also evident that vision, mission, and outcomes were not attended to. This has been confirmed by the data from the documentary analysis, which shows that ICT policies lack vision and mission statements, fail to address goals, and do not specify meeting schedules. In school 1,

for instance, the principal indicated that teachers only attended workshops they were invited to. In follow-up questions, the principal could not elaborate on what the workshops entailed – a sign of insufficient management practices (coordination) concerning ICT implementation.

The data also indicates that the allocation of funds for ICT implementation is insufficient. Hence, one of the participants, S2/P, concurred that he would like to address this issue with the SGB so that funds could be made available for teachers to participate in ICT-based professional development programmes. Apart from realising the need for decision-making, which is also an important management function, this approach may also respond to the need for professional development opportunities by developing digital skills teachers (La Fleur & Dlamini, 2022). This management approach alludes to leading and organising technology resources for teachers, which is crucial for the instructional improvement of the ICT curriculum (Kwatubana, 2023:188). The principal of one of the schools had a *laissez-faire* approach to implementing ICT, believing that motivation comes from teachers and that they should decide for themselves whether or not to use ICT in the classroom (S7/P). This view starkly contrasts the management principle of the leading and organisation of ICT implementation (Buchholz & Knorre, 2023). The aim should be to ensure that teachers master computer skills for improved learning and teaching despite most leaders struggling with effective implementation (Okeke, 2019:51-52). To ensure that new technologies enhance teaching and learning, transformational leaders must assist their teams in implementing them (Al-Husseini, El Beltagi & Moizer, 2021).

Financial support is essential for the principals of some quintile 4-5 schools such as Schools 7 and 8.

> *"As daar kursusse aangebied word, dan vra ons vir personeel, wie wil betrokke wees, ons begroot ook daarvoor. As mense wil, om enige ontwikkelingskursus te doen, maar dit berus ook maar by die personeel self om te besluit, wil ek nog verder verryk"* (S8/P).
>
> [If courses are offered, we ask for staff who want to be involved, we budget for that too. If people want, to do any development courses, but it rests but also with the staff themselves to decide, do I want to enrich myself even further.]

From this feedback, it can be deduced that some principals manage the financial component of ICT, which is another vital management function.

5.4.6.2 Theme 3.2: Principal's support to teachers in planning and integrating ICT in the classroom

ICT strategies that school leaders support are more likely to be effective and successful (Yamamoto & Yamaguchi, 2019:48). Therefore, school principals need to support teachers in the planning and integration of ICT into their classrooms to maximise the value of ICT. As shown in the response below, teachers in S1, S2, S4 and S5 pointed out that the school leaders did not provide sufficient support in terms of planning and ICT integration. According to participant S5/T2, all members of the SMT were required to receive ICT training, stating further that ICT was not integrated into the school. Currently, it is being used only for administrative purposes.

> *"As far as I know, all the SMT members had to go for ICT workshops. I do know that, but ICT is not being used in the classes at the moment. And when it comes to ICT in the Admin Building, they put in our marks if we don't put it in ourselves, but usually they put it in, and the admin clerk she works with the absence. So, we don't get a lot of access to it, and you usually have to ask permission to use a computer to do the smallest of things, and you are supposed to fill in things if you want to print something, and it takes a long... The number of doors you have to go through to get to the end point, is a lot"* (S5/T2).
>
> *"Geen. Nee, daar is nie support nie"* (S4/T1).
>
> [None. No, there is no support.]

This finding is aligned with previous research by Uluyol and Sahin (2016), who contend that management support has been neglected despite significant technological investments. The DBE (2015:10) suggests that the school principal should manage change and improve process situations to get relevant persons to help apply alternative strategies. Support is crucial, and principals should take strategic and proactive steps. These may include communicating the change, providing ongoing training and support on new ICT systems and technologies, and involving all staff members. The progress of ICT implementation should be regularly monitored (Agyei, 2021). Establishing mechanisms for monitoring progress allows transformational leaders to assess whether goals are being met and to make necessary adjustments along the way (Alrowwad, Abualoush & Masa'deh, 2020).

The principals of the quintile 4-5 schools strongly support using ICT in the classroom. Schools in these quintiles have the tools needed to integrate ICT successfully in the

classroom, and greater involvement from staff is evident, as can be seen in the following excerpt:

> *"The ICT committee helps teachers who struggle with the computers and shows them new programs"* (S9/P).
>
> *"I think by giving them the equipment and availability of computers so that they can use it whenever they want to. Computer, printer, whiteboard in all classes. So, everything is there. So, they have the equipment to work with if I need it ... learners have double period, per week, where they have computers"* (S7/P).
>
> *"...it's used efficiently that you don't just have ICT for the sake of ICT, but to make sure it actually enhances your academic offering …the school has a recording studio which enhances effective teaching"* (S8/P).
>
> *"Elkeen het 'n witbord in die klas. En 'n rekenaar in die klas. So, jy kan alles en jy't WiFi in die klas. So, jy het dan alles beskikbaar vir jou"* (S9/P).
>
> [Everyone has a whiteboard in the class. And a computer in the class. So, you can do everything, and you have Wi-Fi in the class. So, you then have everything available to you.]

In quintile 4-5 schools, the researcher observed that teachers' computers, smartboards, printers and other equipment were installed in the classrooms. This is proof that the principals support the integration of ICT in the classroom. Principals play a crucial role in ensuring effective ICT integration by providing teachers with the necessary technological tools, educational software licenses, and ongoing technical support to support curriculum goals, enhance student engagement, and troubleshoot issues without disruption (Cha et al., 2020).

Principals in quintile 4-5 schools provide more significant support for teachers in ICT planning and integration than principals in quintile 1-3 schools. Principals' support for teachers in higher-ranked schools is influenced by resource availability, professional development programmes, community involvement, leadership styles, performance expectations and retention strategies, all of which are challenges lower-ranked schools face (Holmes-Watts, 2024).

5.4.6.3 Theme 3.3: Communication of the school's ICT goals and vision to staff

According to Lambrecht, Lenkeit, Hartmann, Ehlert, Knigge and Spörer (2022), school principals must collaborate with school staff on ICT integration plans in both the short and the long term. Therefore, the ICT goals and vision should be communicated, but this is not the case in almost all the quintile 1-3 schools:

> *"There's no goals, there's no visions, there's no missions, …. The computers and tablets are there. Behind locked doors, and that's all we know"* (S5/T2).

The findings also demonstrate that principals and their SMTs lack interest in driving ICT and fail to monitor the proper use of ICT. ICT implementation is associated with rapid change, which may be one reason for the lack of interest. It is stated in Karunaratne et al. (2018:134) that some managements do not like or approve of change. In addition, authorities do not support the integration of ICT into formal work environments. The data showed another concern, and that is that the attitude of principals is not conducive to embracing technology:

> *"Ek weet nie… die hoof en die SMT dalk nie besef die belangrikheid van ICT. Miskien is dit by hulle ook nog nie dat dit so belangrik is dat alle opvoeders daarmee moet wees nie. .... Ek meen hier is van hierdie jonger mense wat baie beter weet as van die mense wat SMT's is. As hier van hierdie jonger mense gebruik word om meer deel te wees in die ICT, dan sal hierdie skool dalk vorder op 'n punt waar ons weet, hierdie is ons en ek kan enige plek gaan, maar hierdie jong mense word ook onderdruk. … die hoof en die SMT sal moet hulle se mind change oor dit" (S5/T4).*
>
> [I don't know... the head and the SMT may not realise the importance of ICT. Perhaps it is not yet in them that it is so important that all teachers must be with it. I think there are some of these younger people who know a lot better than some of the people who are SMTs. I've been here a long time now, and I see things, and I know. If some of these younger people here are used to be more involved in the ICT, then this school might progress to a point where we know this is us and I can go anywhere, but these young people are also repressed…So, progress in that area will mean the head and the SMT will have to change their minds about it.]

The comments above indicate another interesting dynamic: older-generation principals and teachers may resist ICT. This may be due to a lack of training or exposure, affecting their confidence. They may also experience time constraints and

discomfort with new ICT methodologies. Therefore, principals should provide support and resources to help teachers to overcome their resistance to ICT implementation.

The situation at quintile 4-5 schools seems different regarding communicating the vision, mission and goals. At School 4, for example, there is a committee that drives this process, while teachers are involved in setting goals and the vision and mission of the school. As instructional leaders, school principals should manage staff to share responsibility for achieving the school's mission, vision and goals (DBE, 2016:11). Teachers at Schools 6 and 8 mention that their principals are open to ideas and provide sound support. Research suggests that teachers can successfully implement ICT in their classes if the principal communicates with them and involves them in setting goals, visions and missions regarding the ICT implementation in the school (Razak, Ab Jalil & Ismail, 2019:188). Transformational leaders need to possess a clear vision of how technology can improve educational outcomes. This vision must be communicated effectively to all stakeholders, including teachers, students, parents and the community (Reid, 2023).

Schools are suspected of not budgeting for ICT implementation and neglecting this management function. This raises concerns about principals' ability to manage this challenge, especially as it is possible that schools that struggle financially prioritise more urgent needs rather than technology (Zeng et al. 2018). This is another concerning issue regarding fulfilling their management function, as the Standard of Principalship (DBE, 2016:14) also specifies that it is a principal's responsibility to manage financial and budgetary planning and management. The data in the documentary analysis revealed that none of the schools had budgets available for ICT implementation. It is worth noting, however, that Mahwai and Wotela (2023:56) point out that the DBE has provided schools with technology infrastructure since the mid-2000s but that the project was not coordinated, leaving some rural areas behind. This points to a lack of monitoring support for some schools, especially those in quintiles 1-3, who need it most.

5.4.6.4 Theme 3.4: Monitoring the proper use of ICT

From the data in the documentary analysis, it can be deduced that there are no clear guidelines or policies for the proper use of ICT in quintile 1-3 schools or quintile 4-5

schools. The researcher could not find any evidence in the policies of what may be considered an appropriate use of technology. It was alluded to in earlier sections (cf. 5.4.5.2) that schools in both quintiles lack a programme for professional development to cope with the demands of ICT implementation. This could be ascribed to the fact that principals are also lacking in this regard. The policies obtained were silent on issues related to the monitoring of internet use and responsible behaviour. This is another poor reflection on the participating principals' monitoring skills. Keane, Boden, Chalmers and Williams (2020) state that instructional leaders promote technology integration by setting clear expectations, offering professional development programmes, and providing teachers with necessary resources.

Furthermore, the findings also revealed that ICT policies are not updated regularly; consequently, it will be complicated for principals to address any new challenges or issues in the digital environment. Kafu-Quvane (2022:2) and Alkahtani (2017:34) emphasise that it is crucial for a school's technology plan to purchase new devices, replace old and slow ones, and remain wireless. It isn't easy to monitor the proper use of ICT in schools 3 and 5 because teachers have hardly any access to ICT equipment.

> *"The computers and tablets are there. Behind locked doors, and that's all we know"* (S5/T2).
>
> *"So, the whiteboard just stands there like the ark. Without programs and gadgets"* (S5/T3).
>
> *"Those smart boards, they didn't even connect them. They are just there, locked up there for them to be safe"* (S4/T4).

S4/T1 stated that she had engaged with the principal to seek internet access for teachers and permission to utilise computer laboratories. This request was not approved. According to Akram et al. (2022), teachers' lack of technology access hinders classroom ICT integration. Instructional leaders can address this issue by fostering an inclusive learning environment that allows all learners to develop digital literacy skills and thrive academically. A teacher in school 5 claimed that the principal was more worried about learners and teachers damaging the equipment than anything else and that the computer laboratory access procedure was highly complicated.

> *"It is a process to work in the computer lab or to book out a laptop or data projector. The principal is afraid that we will break something. She doesn't trust us. Now things are just standing there, what a waste"* (S5/T1).

It appeared that it is difficult for principals in both quintile categories to keep an eye on how ICT integration is used in the classroom for various reasons, with the absence of ICT policies being a primary concern. ICT policy-aware schools did not include monitoring ICT use in their policies. Unfortunately, quintile 1-3 school teachers cannot access ICT equipment. ICT integration in education enhances teaching and learning, but the lack of monitoring by the principal presents challenges. Addressing this requires targeted training, clear guidelines, and effective technology use (Mutwiri, Kafwa & Kyalo, 2021:219). Karakose et al. (2021) state that principals should monitor the proper use of ICT in classrooms effectively to ensure that it contributes positively to educational outcomes while preparing students for a digitally driven world.

5.4.6.5 Theme 3.5: Management of ICT hardware and software

The findings revealed that principals are not actively managing ICT hardware and software. There was no evidence, for example, of how they work with IT staff and teachers to develop a comprehensive technology plan that outlines the goals and objectives for using technology in the school. Principals should take an active role in managing ICT hardware and software. Principals must manage and control ICT hardware and software purchases due to possible high costs. Not all educational institutions have access to the necessary tools, however (Bariu, 2020:2). It also seems that ICT resources are not regularly evaluated or updated, as can be seen from the following comments from the participants:

> *"The software we have is outdated. And it's not activated in all gadgets or all computers that we have"* (S1/T2).
>
> *"I can recall we received computers. I think it's in 2000 or 1999. Brand new, it's outdated now, because it's not been used"* (S5/T3).
>
> *"En ons kan nie regtig veel sê van die software nie, want soos daar gesê is, dis outdated en al sit jy hoeveel software voor 'n mens,as jy nie die actual tool het om daai software te gebruik nie, dan wat help dit?* (S5/T3).
>
> [And we can't really say much about the software because, as has been said, it is outdated and even if you put however much software in front of a person, if you don't have the actual tool to use that software, what does it help?]

Poor management of ICT sources hampers progress in advancement in the field. This study revealed that principals in quintile 1-3 schools fail to provide sufficient training and support on integrating ICT in the classroom. Policies are not enforced simply because they are absent. Hence, it stands to reason that most schools are not compliant with relevant policies for technology use. The researcher reached this conclusion regarding the lack of equipment after observing that most of the computers in quintile 1-3 schools were outdated and that some lacked the software to operate correctly. The findings also show no evidence of collaboration with ICT staff on important issues such as purchasing and budget planning. The principal of School 1 indicated that the school had received their ICT equipment and donations from the Department of Education.

> *"We were fortunate to receive computers, smartboards, tablets and printers from the department. I think two years back, we got a couple of tablets, I don't remember which company, yes…, we don't have money to purchase. We rely on donations"* (S1/P).

Teachers S1/T1 and S1/T3 from the same school attested to computers in the classrooms but noted that hardware and software were not given priority in the school and that computers and tablets lacked the required software. According to Butcher (2023:120), computers and computer-related equipment can be expensive if not properly maintained. The most significant barrier to increasing ICT use is related costs, even with infrastructure and program design concerns. In the preceding section, participant S4/T1 mentioned that teachers asked for specific gear and software to be purchased for instructional purposes. Still, sadly, the school management was unwilling to support this request. The development of digital literacy, stakeholder collaboration, operational efficiency, cost-effectiveness, educational outcomes, and flexibility to technological changes are all greatly influenced by the efficient administration (or lack thereof) of ICT gear and software in schools (Zhang, Khan, Dagar, Saeed & Zafar, 2022).

5.4.6.6 Theme 3.6: Management of infrastructure

The study revealed little evidence of efficient ICT infrastructure management to ensure optimal performance. This is evident in the following comments by two of the principals, which also pointed out that finance is a problem:

> *"…the school can't afford a technician to repair broken computers. We don't have money to buy more computers because it's not enough for the whole school"* (S4/P).
>
> *"It might be that I didn't have that, but with the talk that we have done, it means having already indicated that the one teacher, the departmental head, is taking the lead in making sure that the computer centre is utilized and then, I must just give her the support"* (S2/P).

This is supported by the analysis of the documents, which also did not indicate that regular maintenance or upgrading of ICT is crucial to prevent deterioration and ensure functionality. The data also discloses that principals fail to manage assets and that infrastructure is not prioritised. It also seems that principals do not involve the rest of the SMT in the collaboration and coordination of projects. Schools 2, 4, and 5 principals in quintiles 1-3 said they do not involve their SMTs in this process. This could be due to a lack of understanding about how to do so or familiarity with implementing ICT in the school. An ICT committee in Schools 1 and 3 oversees coordinating and cooperating on ICT projects. Despite not being entirely operational, these ICT committees provide the necessary foundation. The teachers' response alludes to this fact.

> *"There is a computer lab with computers, smartboard, a printer, etc …it is just there…"* (S5/T4).
>
> *"We don't know if we can use it…the keys are in the principal's office…"* (S5/T3).

Principals should establish clear communication channels, involving all stakeholders in decision-making and monitoring of infrastructure conditions, as this is essential for maintaining a safe learning environment (Owan, Asuquo & Etudo-Eyor, 2022:10). The documentary analysis showed no sign of long-term planning that anticipates future needs and challenges. On a question, the principals could not provide the researcher with evidence of how ICT implementation is monitored and evaluated. This is important to identify areas for improvement. It was also not clear how infrastructure complied with relevant regulations and standards. Infrastructure should be managed to respond to environmental, social and economic considerations (Bariu, 2020:2).

On the other hand, it is evident that the quintile 4-5 school's ICT infrastructure is operational and in excellent condition and that teachers and students regularly utilise it. According to the researcher's observations, nearly every classroom included ICT equipment, such as smartboards and a teacher's laptop or PC.

> *“Daar is nog net 'n paar klasse wat al die interaktiewe witborde gekry het, maar hulle het dit hierdie jaar nou begin upgrade, so mettertyd gaan almal dit ook hê. Maar al die klasse het ’n smart tv met ‘n computer wat hulle kan gebruik nogsteeds, en almal het access tot internet…*” (S9/T1).
>
> [There are still only a few classes that have already got interactive whiteboards, but they started to upgrade them this year, so in time, everyone will have them too. But all the classes have a smart TV with a computer that they can still use, and everyone has access to the internet...]

The principal must manage and control the utilisation of the school's ICT infrastructure, ensuring that it benefits both teachers and learners and aligns with subject and learner characteristics (Kundu, Bej & Dey, 2020:221).

5.4.6.7 Summary of the findings of category 3

The data under this category focused mainly on the principals’ managerial responsibilities. The analysis shows that principals in low-quintile schools have identified a lack of focus on vision, mission, and outcomes in their ICT implementation strategies. Insufficient funding and a lack of professional development programmes are noted issues. Financial support is crucial for effective implementation, while transformational leaders are essential for successful technology adoption (cf. 5.4.5.1). School leaders are vital in integrating ICT into classrooms. Yet, teachers often lack support (Yamamoto & Yamaguchi, 2019:48). Principals should strategically communicate, train, and monitor ICT implementation, influenced by resource availability and performance expectations (cf. 5.4.5.2). School principals and staff face challenges in collaborating on ICT integration plans due to rapid change and lack of support. Older-generation principals and teachers may resist ICT implementation due to insufficient training, exposure, and time constraints. Principals should provide resources and support (cf. 5.4.5.3). The documentary analysis reveals that schools in quintiles 1-3 and 4-5 lack clear ICT use guidelines and professional development programmes and policies. Principals' lack of monitoring skills hinders technology integration. Schools 3 and 5 struggle to monitor ICT use due to limited technology access, requiring targeted training, clear guidelines, and effective technology use (cf. 5.4.5.4). The data indicates that the principals need to manage ICT hardware and software to promote digital literacy, stakeholder collaboration, operational efficiency,

cost-effectiveness, and flexibility (Butcher & Hoosen, 2020). However, besides outdated software, there is a lack of active involvement and resources in quintile 1-3 schools. Insufficient training, obsolete computers, and lack of collaboration with ICT staff hinder ICT use (cf. 5.4.5.5). Costs remain a significant barrier (Butcher & Hoosen, 2020). The study reveals inefficient ICT use in schools, with principals failing to manage assets, prioritise infrastructure, or involve stakeholders in project collaboration. An ICT committee in schools 1 and 3 is responsible for coordinating projects, but no long-term planning or evidence of ICT implementation monitoring or evaluation is evident (cf. 5.4.5.6).

5.4.7 Category 4: Strategies for successful ict implementation

This study shows the need for principals to adopt strategies within their leadership and management practices to ensure successful ICT implementation. This will maximise the benefits of technology for learners, teachers and the larger school community. More specifically, it will help all stakeholders support learning in the digital age. These leadership strategies align with principals' instructional and transformational leadership responsibilities. Strategies are also aligned with the management theory (cf.4.5).

5.4.7.1 Theme 1: Leadership strategies

i. Vision and mission for effective ICT implementation

Creating a vision and mission for effective ICT implementation in a rapidly educational environment is a crucial facet of principal instructional leadership responsibilities (Berkovich & Hassan, 2024). The excerpt below is indicative of the need for such a vision:

> *“Remember, these days, you give a child a TV game, he excels in it. You give a child a phone even if you’ll find that old people cannot manoeuvre a phone but, you give it to an SE learner and say: “Ek kan nie games...” I can't download games; a child will do it. So, I want ICT to be part of a school. You understand? It must not be such a foreign thing in a school. It must be like, a daily thing. For instance, when we had COVID, I wanted us to fill in those forms, have Google forms to complete the COVID*

cases, to complete how the children feel, the temperature, everything. I want actually, to have a school that fits into the 21st century" (S1/P).

This vision should be clear and should include a strategic implementation plan. The vision should be communicated to the teachers and other role players, such as parents. This will ensure everyone understands the ICT initiative's goals and objectives (Berkovich & Hassan, 2024). An essential focus of ICT implementation in low-quintile schools is prioritising ICT initiatives. Principals must focus on developing teacher capacity and resources for effective ICT integration (Yurtseven Avci, O'Dwyer & Lawson, 2020). As part of the vision and mission, principals should drive initiatives that include collaborations with other schools and organisations to share expertise. This collaboration should also include ways to monitor and evaluate the impact of ICT initiatives (Tonich, 2021).

ii. Professional development for capacity building

Much has been said about professional development initiatives for teachers. This study, which focuses on the role of the principal in ICT implementation, shows that principals also need to improve their leadership skills through training in ICT, especially those in quintile 1-3 schools. This study has displayed the need for principals to enhance their capacity in ICT, as is evident in the following comment from SP3:

"It has helped me a lot, you know. When I look at the world today, in the 21st century, you cannot live without learning how to manoeuvre a computer. Even a phone itself is a computer these days."

Professional development in ICT implementation will help principals understand the demands for teacher professional development in ICT (Hu, Yuan, Luo & Wang, 2021). High-quality professional development is essential to enhance their instructional and transformational leadership skills (Bellibaş et al., 2021). This study has pointed out the fact that principals in quintile 1-3 schools have limited instructional knowledge of ICT (cf. 3.4.5). Therefore, this is an area that requires attention in professional development programs for principals, as principals need to provide direction to teachers and to set an example that ICT instructional knowledge is a crucial focus in the school. One of the principals at a quintile 1-3 school admitted the need for training:

"Continuous professional development for teachers in ICT-related instruction is equally important. Hence, principals must organise such opportunities for teachers. One, I must give support. Two, I must, of course, provide instruction, with the SGB and encourage people to make use of them to the benefit of kids. And if there are so developments and training that teachers must undergo, then we need to allow them to go for such kind of training. And now you have come, and we can now understand that you have knowledge of that, we'll use you to help us in that development" (S2/P).

The data reveals that professional development is less desired in quintile 4-5 schools, with most of the participants indicating that they have a good grasp of ICT and address challenges through training and workshops. Some apply self-directed learning approaches to master ICT skills. The excerpt from one of the principals testifies to this and some noteworthy strategies for ICT improvement:

"Anita het baie sterk leiding geneem, toe sy nog hier by die skool was. Sy en haar ICT span, sy't so klompie personeel deel gemaak van die span, en ons het hulle in groepe gedeel en in temas. So, as jy byvoorbeeld 'n bietjie ondervinding nodig gehad het in PowerPoint, het ons dit in 'n PowerPoint lesing aangebied. En dan het almal dit nou bygewoon, of dié wat voel hulle sukkel met dit, het dit bygewoon. Of as jy byvoorbeeld goeters net moes aflaai van die internet af, hoe doen jy dit. So verskillende, dis so in katogoriëe – eintlik, basies – verdeel en dan natuurlik die verskillende programme wat gebruik word. As jy byvoorbeeld 'n Wiskunde onderwyser is het sy vir ons destyds baie vertel van jy kan hierdie tipe programme gebruik daarvoor. Of as jy 'n taal onderwyser is, dan kan jy eerder daar gaan gebruik. Sy't vir ons baie van daai tipe goed gegee. Ek moet erken, ons het van ons personeel vir 'n opleiding gestuur vir ICT by die Universiteit. Dit was 'n hele jaar se opleiding gewees. So, ek moet sê, dis seker nou so in 2018 gewees, met COVID het alles mos nou gestop, sedertdien het ons maar net eintlik ons interaktiewe witborde gebruik, wat ons begin om so te installeer by die skool. Gedurende die COVID tyd, het ons ons eie e-platform by die skool gestig en ons het opleiding vir die personeel gegee hoe om werk op dit te laai, hoe om jouself af te neem op 'n video call of Zoom of wat ook al op te neem. En dit vir die kinders te stuur, so dit is wat ons in die COVID tyd daai gedoen het" (S9/P).

[Anita took very strong leadership, when she was still here at the school. She and her ICT team, she made a lot of staff part of the team, and we divided them into groups and themes. So, for example, if you needed some experience in PowerPoint, we presented it with a PowerPoint lecture. And then everyone attended, or those who felt they were struggling with it, attended. Or if, for example, you just had to download

things from the internet, how do you do it. So different, it's divided into categories – actually, basically – and then of course the different apps that are used. For example, if you are a Maths teacher she told us a lot at the time about how you could use these types of programs for that. Or if you are a language teacher, then you can go there to use instead. She gave us a lot of that type of stuff. I have to admit, we sent some of our staff for a training for ICT at the University. It was a whole year of training. So, I have to say, it was probably like this in 2018, with COVID everything stopped now, since then we've just really used our interactive whiteboards, which we're starting to install like that in the school. During the COVID time, we established our own e-platform at the school, and we provided training for the staff on how to upload work, how to record yourself on a video call or Zoom or whatever. And sending it to the kids, so that's what we did in the COVID time.]

The study also showed the need for greater collaboration among teachers and between teachers and principals. Therefore, principals as instructional leaders should encourage collaboration among teachers to share best practices and resources for curriculum integration (Bellibaş, Gümüş & Liu, 2021). For this reason, principals in quintile 1-3 schools must provide additional and rigorous ongoing support through regular training sessions and workshops.

iii. Dealing with resistance among staff

One of the thorniest issues that emerged from the ICT implementation data is the resistance from older teachers to ICT usage. This issue was evident in both the low- and high-quintile schools.

> *"The role of the leader will be to encourage people to have a paradigm shift. For instance, there are teachers that are old – very, very old. They don't want to shift from what they used to know. They want to stay in the old methods. So, you must encourage your teachers. Like I said, show them the advantages of using ICT in class with the type of learners we have these days. Because if they are not encouraged, the teachers, remember if teachers are negative, everything turns out to be negative. But if you make them positive, then they use it positively. That is the role"* (S1/P).

It is, however, not just older teachers that resist ICT implementation but also other teachers as well, and this is because of various reasons such as lack of knowledge of ICT (cf. 3.4.2) and lack of time (cf. 3.4.4), and also specific individuals don't cope well

with change (cf. 3.4.6), etc. Transformative leadership effectively addresses teacher resistance to ICT implementation by promoting collaboration, empowerment, and a shared vision, fostering an adaptive culture that embraces technological advancements in education. Transformative leadership effectively addresses teacher resistance to ICT implementation by promoting collaboration, empowerment, and a shared vision, fostering an adaptive culture that embraces technological advancements in education (Kılınç et al., 2024).

iv. Curriculum alignment

In both groups of schools, it was impossible to establish how principals ensure that ICT is aligned with the CAPS curriculum. However, principals should work with teachers to ensure that technology is sufficiently aligned with the goals of the curriculum (Shemshack, 2021). Moreover, they should ensure technology integration into teaching and learning activities. This should be done through classroom observations and supervision of instruction (De Vera, Andrada, Bello & De Vera, 2021). The data displays that principals are not engaged in classroom observation practices and that they require assistance from the education department:

> *"It's just, as a principal, I would need much more support and intervention from the departmental side. From the department's side to say, okay, how can we help, or how can we assist the principal?"* (S5/P).

Supervision of ICT instruction is crucial to observing teachers' practices in ICT implementation (Wiyono, Wedi, Ulfa & Putra, 2021). Additionally, principals mentioned the importance of encouragement to get teachers motivated. However, principals should also provide training to utilise data for improved ICT usage in the classroom.

> *"No, we have a register we use. It's not daily. We have the register whenever a teacher uses the computer room, and the teacher must complete the register. That's the only thing we do"* (S1/P).

Curriculum alignment is crucial for integrating educational content, teaching methods, assessments, and learning outcomes with technology, thus ensuring that technology serves as a meaningful tool for effective learning rather than just an add-on to traditional teaching methods (Roehrig, Dare, Ring-Whalen & Wieselmann, 2021). Transformative leadership emphasises collaboration, teacher empowerment,

community feedback, and a holistic approach to education, fostering curriculum alignment, quality, and effective addressing of diverse learner needs (Tan, Chan, Bielaczyc, Ma, Scardamalia & Bereiter, 2021).

v. Resource allocation

ICT implementation will not be successful if principals fail to ensure that schools have adequate resources, including technology tools (cf. 3.4.7), infrastructure (cf. 3.3.3), and technical support (cf. 3.3.3.4). This study revealed that resources at schools 1-3 are highly problematic. To counter this challenge, principals should work closer with the district offices to secure resources for technological infrastructure. According to Komalasari, Arafat and Mulyadi (2020), it is also essential that principals secure funding for resources and infrastructure. This study also revealed that schools in the lower quintiles experience challenges ensuring that equipment is safe. Hence, principals should also address this issue by engaging with the department and safety agencies. Improving resources may involve seeking partnerships with businesses and governmental departments for funding and equipment (Penuel, Riedy, Barber, Peurach, LeBouef & Clark, 2020). The example that principals set is vital as explained by a principal:

> "*I have to do things that show them. You show those people by example. Provide the resources, make sure they are using it and have enough time to make sure. That is what I'm supposed to do"* (S4/P).

Since transformative leadership emphasises a comprehensive approach, stakeholder participation, flexibility in the face of change, and prioritising long-term vision over present demands, it typically addresses resource allocation (Huang, Jiang & Chang, 2023).

vi. Supervision of instruction

Supervision of instruction is an essential tenet of the instructional leadership theory. Principals should remember this during ICT implementation processes (cf. 3.6.4). It should be monitored regularly, and the study findings show that this is lacking. For example, the documentary analysis confesses no evidence of monitoring and

supervision practices, while the interviews did not disclose such practices. On a follow-up question to establish the role of the rest of the SMT, it seems that this is another concern, as can be seen from the excerpt below:

> *"They should play a role, but it's not effectively happening because the department also employs this EAs – Education Assistants – and three were allocated for ICT. And the reason why I'm saying they are not fully being utilised or used is because we use them now for other things to do instead of focusing on the ICT. So, in a way, we are not managing, as an SMT, that correctly"* (S5/P).

This indicates that the entire SMT needs to perform the supervision function (DBE, 2015). This is primarily because principals are challenged by workload issues as well. However, Plaatjies (2019) claims that the data and feedback from monitoring and evaluation practices should support principals in making informed decisions about the effectiveness of technology integration in the classroom. This will enable principals to recommend adjustments to address challenges.

vii. Attitudes of principals

This study also points out that principals should have a positive and proactive attitude toward ICT implementation (cf. 3.4.3). The demands of the 21st century in ICT require knowledge and understanding of new ways of using technology (Moshinski, Pozniakovska, Mikluha & Voitko, 2021). Therefore, principals must embrace technological advancements and innovations to enhance teaching and learning. Principals' leadership style significantly impacts teachers' perception and engagement with ICT initiatives, as they must prioritise technology and communicate its significance to ensure support and engagement (AlAjmi, 2022). This study shows that principals in quintile 1-3 schools are not always optimistic about ICT implementation. It should be noted that the contextual challenges may be daunting and hindering for them. To remain positive in an environment characterised by poverty and hardships may be easier said than done. Principals who view technology as optional may allocate limited resources towards ICT initiatives, leading to outdated equipment and restricted access to digital tools, stifling innovation (Thangeni, 2022) – even more so if principals themselves lack the capacity for improvement. However, it is incumbent upon principals to show a resolute dedication to ICT implementation and to provide instructors with passionate assistance (Polius, 2022).

At quintile 4-5 schools, there are many more ICT activities than there are in quintile 1-3 schools, and it seems that principals are also much more excited about ICT implementation:

> *"So, almal is entoesiasties, en om te sien hoe die kinders dit geniet en ook nie net dit geniet nie, maar ook om hulle akademie daardeur te verbeter. En dit is regtig waar, en ons love dit ook"* (S9/P).
>
> [So, everyone is enthusiastic, and to see how the children enjoy it and not only enjoy it, but are also improving their academics by this. And it's really true, and we love it too.]

School leaders must adopt a positive attitude towards technology to promote innovation and successful ICT integration in education systems worldwide (AlAjmi, 2022). As a transformational leader, the principal must focus on creating a vision for the future, fostering innovation, and empowering stakeholders throughout the school community (Riswanti Rini, 2022). This leader inspires long-term commitment through shared vision and collective empowerment (Lasrado & Kassem, 2021).

viii. Promoting collaboration

ICT implementation requires collaboration and the sharing of best practices. This is another critical strategy to ensure progress in this field. Principals should foster a culture of collaboration among teachers, encouraging them to share best practices and lessons learned in integrating ICT into their teaching (King-Smith, Watkins & Han, 2020). This may involve setting up regular meetings or forums for teachers to discuss their experiences and challenges with ICT implementation. This study shows that principals should utilise the skills of younger teachers who are more tech-savvy:

> "*But the new generation, they are familiar because most of them they've got this sophisticated phone. One of the benefits that we have, we are given the assistant teachers, particularly this, and reading champion, they are very, very familiar with this new technology. I've already made a little bit that they are helping, but it might be that one has to do more in that encouragement"* (S2/P).

To improve educational outcomes, principals are essential in building a collaborative culture by encouraging collaboration throughout ICT implementation, offering professional development, involving stakeholders, and monitoring progress (Mogas,

Palau, Fuentes & Cebrián, 2022). Transformational leadership is a more effective approach, focusing on collective action, empowering educators, fostering strong school relationships, and encouraging innovative technology use use (Litz & Blaik-Hourani, 2020).

5.4.7.2 Theme 2: Management Strategies

i. Develop a clear ICT policy and implementation plan

This study confirms the need for well-defined ICT policies for smooth ICT implementation (cf. 3.5.2). The findings show that this is an area where most of the schools in both quintiles are seriously lacking.

> *"We have an ICT policy, although it's not yet approved by the SGB"* (S1/P).
>
> *"No, we don't have"* (S2/P).
>
> *"…het ons nie 'n formele policy nie"* (S9/P).
>
> […we do not have a formal policy.]

ICT policies should outline the purpose, goals and guidelines for ICT use in schools. Such policies should include issues about access (how teachers and learners will have access to technology tools and resources) and appropriate and responsible use (cf. 3.5.2). These should include internet and social media usage rules. Machmud, Widiyan and Ramadhani (2021) add that policies should also include issues related to the protection of learner and teacher data, as well as the ethical use of technology, and there should be an outline of proposed professional development strategies and support, including technical support. The policy should provide direction in terms of accessibility, especially for learners with disabilities (Machmud et al., 2021).

According to Gümüş and Bellibaş (2020), principals should ensure that budget and resources are included, as well as how the school will allocate funding and resources. The document analysis process indicated no evidence that a budget was allocated to ICT implementation in the three schools that produced ICT policies. Such a policy should include strategies for collaboration and communication between role players (Semenets-Orlova, Klochko, Tolubyak, Sebalo & Rudina, 2020). Lastly, policies should provide clear directives for effective monitoring and evaluation (Machmud et al., 2021). A well-defined ICT policy is crucial for schools to effectively utilise

technology in education, ensuring safety, equity, professional growth, continuous improvement, and alignment with broader educational standards (Marrone, et al., 2021). Transformational leadership highlights the formulation of visions, stakeholder participation, and adaptation in quickly evolving technical environments. It promotes creativity, encourages people to work toward common goals, and facilitates seamless execution processes (Lewa, Mburu & Murigi, 2022).

ii. Management of ICT Infrastructure

Ensuring the school has an adequate infrastructure is another critical task of the principal in ICT implementation. This includes reliable internet connection, sufficient hardware and software, and support services (Navaridas-Nalda, Clavel-San Emeterio, Fernández-Ortiz, & Arias-Oliva, 2020). This infrastructure should be subjected to stringent safety measures, especially in quintile 1-3 schools that experience some discouraging challenges in this regard (cf. 3.3.3). The responses of the principal in school 7 include the following:

> *"There's a computer in every classroom. There's a data projector I think, in every classroom. There could be one or two exceptions. There's a computer lab. And then there's the recording room. Actually, I think there's a small computer lab next to the computer lab as well."*

The researcher observed that quintile 4-5 schools possess ICT infrastructure conducive to ICT integration in the classrooms. The ICT infrastructure in these schools is also well maintained. Although instructional leadership is frequently connected to educational environments, managing ICT infrastructure can also benefit from its tenets (Lambrecht et al., 2022). Enterprises must manage their ICT infrastructure effectively to exploit technology, reduce risks, and provide a robust IT environment that supports strategic objectives (Kumar, Sharma, Singh, Alwadain, Choi, Manual-Brenosa, Ortega-Mansilla & Goyal, 2021). Insufficient funds may hinder procuring security measures such as alarm systems and surveillance cameras. Security gates should be considered to prevent break-ins (Timm, 2021). Principals should, therefore, develop and enforce strict policies and procedures for using ICT equipment, including safe storage and handling (cf. 3.5.2). Training should be provided to staff on safety measures, and they should work closely with local law enforcement agencies. Parental

involvement is vital, and parents should be informed that ICT equipment must be safeguarded. They should also be advised that suspicious and criminal activities should be reported (Bariu, 2020). ICT infrastructure must be adequately managed to achieve corporate goals and improve efficiency, lower costs, mitigate risks, ensure scalability, improve security, facilitate decision-making, improve user experiences, and foster innovation (Agyei, 2021). Since creativity, flexibility and creative thinking are essential to survival in today's ICT environment, transformational leadership thrives in the dynamic world of technology management (Bukusi, 2020).

iii. Management of the ICT budget

This study highlights the importance of budgeting and managing funds allocated to ICT (cf. 3.3.3.3). In lower quintile schools, principals must look for competitive quotes to ensure the best value for money. Principals should also remember that they must budget for maintenance, training, technology upgrades, and other unexpected costs (Tigere & & Netshitangani, 2020). Therefore, they should monitor and keep detailed records of expenses. As professional development has been pointed out as a crucial component, funds should be allocated for this aspect as well (cf. 3.3.3.3). To inform future budget planning, principals should consider making sure that they are aware of advancements in ICT that could be implemented. Principals must ensure that funds are available for ICT resources and maintenance to ensure the school has the necessary technology to support teaching and learning (Munje & Jita, 2020). Spending should be prioritised, and the school's most critical needs should be identified. Therefore, principals should conduct a thorough assessment of the requirements for ICT. One of the quintile 4-5 schools alluded to their strategy in this regard:

> "*We try to buy the necessary equipment for teachers when teachers ask for it … you will see that all our teachers have computer data projectors in their classes"* (S6/P).

It is also evident from the observations that schools in quintile 4-5 budget for ICT. This is evident from their well-functioning ICT infrastructure. Effective management of an ICT budget in schools requires a multifaceted approach that includes understanding contextual needs, strategic planning, careful allocation of funds, continuous monitoring and evaluation, investment in professional development, leveraging partnerships for additional resources, and future-proofing investments against rapid technological

changes (Divayana, Suyasaand & Widiartini, 2021). Usman (2020) believes that transformational leadership emphasises innovation, inspires teams, and positions organisations for growth by fostering a culture that embraces change and encourages collaboration.

iv. Managing teacher professional development

Teacher professional development must be managed well if teachers are to successfully incorporate ICT into the classroom and make sure they have the requisite knowledge and abilities (cf. 2.9.7). The data under this theme reveals that schools in both quintiles do have professional development activities, but that it is conducted informally. No planned professional development programme addresses specific areas of ICT.

"No, no. Informal training, yes" (S6/P).

> *"Ons het nie, ons het interne training ja, maar ons het nie van eksterne training gehad nie"* (S9/P).
>
> [We didn't, we had internal training, yes, but we didn't have external training.]

Principals should prioritise staff training in ICT to ensure that teachers are proficient in using technology effectively in the classroom (cf. 2.9.7). It was interesting to note that some schools regard departmental training as insufficient:

> *"En dit voel net vir my partykeer die Onderwys Departement, wat eintlik ons hoof werkgewer is, is myle agter van waar ons moet wees. En ek verstaan hulle situasie, want hulle moet nou kyk na skole in rural gebiede waar daar nie finansies is nie. Ek verstaan hulle probleem, maar dit rem 'n bietjie van ons ander skole om vooruit te gaan. So, ek verwag dat my personeel gereeld opgelei moet word, maar ek wil ook sê, dit moet deur kundige mense aangebied word. Op hierdie stadium voel dit of ons personeel is 10 tree voor die Onderwys Departement. En as die Onderwys Departement kom vir opleiding, is dit goeters wat ons al lankal ken. So ons soek 'n bietjie daai "the next level" van opleiding"* (S9/P).
>
> [And it just sometimes feels to me as if the Education Department, which is actually our main employer, is miles behind where we must be. And I understand their situation because they have to now look at schools in rural areas where there are no finances. I understand their problem, but it slows our other schools down a bit from moving

> forward. So, I expect my staff to be regularly trained, but I also want to say training should be offered by knowledgeable people. At this stage, it feels as if our staff is ten steps ahead of the Education Department. And when the Education Department comes for training, it's stuff we've known for a long time. So, we are looking for a bit of

The excerpt above shows the dilemma for departmental officials when it comes to training. One group may not need training, while others do not have the necessary equipment. Principals should encourage professional development, such as workshops. Principals should empower teachers to take ownership of their professional development, aligned with the school goals in terms of ICT (Kilag & Sasan, 2023). Sterrett and Richardson (2020) opine that principals should provide ongoing support and resources, enabling teachers to implement new strategies learned through professional development. Paul (2021:68) think that instructional leaders are dedicated to enhancing the quality of instruction through workshops, coaching sessions, and peer observations. Principals should outline a thorough strategy for handling teacher professional development in ICT implementation, and this includes: i) assessing needs and contexts; ii) designing user-centric programs; iii) utilising existing technologies; iv) offering multiple access points; v) training on technology use; vi) ensuring technology support development goals; and vii) continuous evaluation and feedback (Yurtseven Avci et al., 2020). Transformational leadership promotes sustainable change in educational institutions by combining data-driven instruction with inspiring teachers, fostering a shared vision and promoting continuous improvement for teachers and learners (Sharma & Adeoye, 2024).

v. Monitoring and evaluation

Regular monitoring and evaluation of ICT use in the school can help identify areas for improvement and ensure that ICT resources are being used effectively to support student learning (cf. 3.6.4). This may involve collecting data on learner engagement with digital tools, assessing the impact of ICT on learning outcomes, and seeking feedback from teachers, learners and parents (Elbasyouny, 2021). This is the response of the principal in one of the schools:

> "*…in all, we have the deputies and also the two departmental heads. They're doing so much. We've got monitoring and control, we've got the meetings that of course, they're having how to plan the lessons and how to do presentation in the class"* (S2/P).

This finding indicates that SMT members should all form part of the monitoring and evaluation of ICT. The principal as “leader of the leaders” should, however, assess this progress regularly towards meeting the objectives outlined in the monitoring and evaluation plan (cf. 3.6.4). During this process, principals should obtain feedback from teachers, learners and parents to gain a better understanding of the effectiveness of ICT implementation (Akram & Khan, 2020). Principals should monitor and evaluate the impact of ICT on teaching and learning outcomes and use this information to make informed decisions about future investments in technology (Khaleel, Alhosani & Duyar, 2021). In addition to solving current technological challenges, transformational leadership cultivates a long-term commitment to continual development through technology utilisation, resulting in a thriving atmosphere among teachers (Timotheou, et al., 2023).

vi. Communication

Effective communication is crucial for building relationships, enhancing collaboration, problem-solving, morale, leadership, feedback, change, inclusivity and achieving collective goals (Marbun, Antarani & Putri, 2023). Principals should use ICT to facilitate communication and collaboration within the school community, including with teachers, students, parents and other stakeholders. ICT promotes communication by providing instant connectivity, enhancing collaboration through diverse channels, and improving access to information globally while supporting effective feedback mechanisms with multimedia capabilities. The response below illustrates how the principal of School 4 communicates:

> *“Because certain things we're not using them, but I'm using the ones that I'm familiar with. WhatsApp, Telegram, Twitter, Facebook, emails that we are using. Those are the ones that are helping us because it is the life that we are living now”* (S4/P).

To keep staff, students, and parents informed about critical updates and policy changes, the principal should establish effective communication channels using ICT, including email, school management systems, and messaging apps (Komalasari et al., 2020). According to Mandinach and Gummer (2021), implementing a Learning Management System (LMS) can improve communication, keep parents informed, and foster a collaborative environment for learners to engage effectively with learning

materials. Regular updates and communication using ICT tools and surveys are essential for maintaining transparency in the school community (Eutsler, Antonenko & Mitchell, 2021). Open communication is crucial for effective ICT tool management, and principals should model this behaviour by being accessible, engaging with the community, and promoting collaboration and innovation (Nguyen & Ng, 2022). Mandinach and Gummer (2021) assert that principals are responsible for setting clear policies, ensuring ICT tools abide by student data protection laws, and emphasising data security and privacy in digital communication. According to Rasheed, Hookmani, Waleed, Fatima, Siddiqui, Khurram and Hasan (2021), the principal should create a social media strategy to effectively use these platforms for sharing news, celebrating achievements, and engaging with families while adhering to school values. To effectively promote ICT in school communication, transformative and instructional leaders are essential. Their efficacy is contingent upon the unique requirements of the school community. They emphasise innovation and instruction improvement (Docdocil & Itaas, 2021).

5.4.7.3 Summary of the findings of category 4

A clear vision and mission are fundamental for effective ICT implementation in a rapidly evolving educational environment (Berkovich & Hassan, 2024). Principals should prioritise ICT initiatives, develop teacher capacity, drive collaborations, and monitor their impact. Professional development is essential for capacity building, especially at quintile 1-3 schools. Principals should organise opportunities for teachers to receive ICT-related instruction and support them. Nevertheless, in quintile 4-5 schools, most participants have a good grasp of ICT and may use self-directed learning approaches (cf. 5.4.5.1; ii). The study emphasises the need for collaboration between teachers and principals in implementing ICT in schools. Principals should encourage sharing best practices and resources, provide regular training, and address resistance from older teachers (cf. 5.4.5.1; iii). The study emphasises the need for principals to secure adequate resources for ICT implementation, particularly in schools 1-3, to address funding, safety issues, and safety concerns (cf. 5.4.5.1; iv). Transformative leadership, stakeholder participation, and data-driven decision-making are imperative for effective technology integration (Huang et al., 2023). The study highlights the importance of positive attitudes towards ICT implementation in schools,

highlighting the impact of leadership style on teachers' engagement (cf. 5.4.5.1; v). It suggests adopting a transformational leadership approach, focusing on vision, innovation, and stakeholder empowerment and promoting teacher collaboration to ensure progress in ICT implementation (Ruloff & Petko, 2022:7). The study highlights the importance of a clear ICT policy in schools, focusing on transformational leadership, adequate infrastructure, and strict equipment usage policies to enhance efficiency, reduce costs, and foster innovation (cf. 5.4.5.2, i). The report highlights the importance of budgeting and managing ICT budgets in lower-quintile schools. It suggests competitive quotes, cost monitoring, and allocating funds for maintenance, training, and technological upgrades (cf. 5.4.5.2, iii). Principals should prioritise ICT staff training to ensure that teachers are proficient in integrating technology into classrooms, as informal training lacks ICT-specific programmes (Yurtseven Avci et al., 2020). Regularly monitoring and evaluating ICT use in schools can identify improvement areas, while transformational leadership fosters a thriving environment (cf. 5.4.5.2, iv). Effective communication, policies, and social media strategies are crucial for collaboration and transparency (cf. 5.4.5.2, v).

5.5 DOCUMENTARY ANALYSIS

This study utilized documentary analysis also as a data collection method, as discussed in chapter 4. The researcher investigated the policy documents at the participating schools, which was done according to pre-determined criteria on a checklist. The principals were requested to provide me with a copy of the school's ICT policy. My objective was to determine whether the school had a policy, what the content of the policy implied, and whether the teachers adhered to it. The ICT Policy was available in four of the nine schools sampled. A copy of an ICT policy was not available at six of the nine schools. The tables under 5.5, 5.6, 5.7 and 5.8 will shed more light on how policies were applied at the schools.

Table 5.5: ICT policy of School 1: Analysis of ICT policy

Description	Comments
A: ICT-related policies	
(i) ICT policy of the schools	School is in possession of an ICT policy.
(ii) Provincial ICT-policy	School did not use Provincial ICT-policy when drafting an ICT-policy for the school.
(iii) National ICT-policy	The White Papers of
B: Leadership and Management	
(i) Professional Development: Teachers	The ICT policy doesn't make provision for professional development for teacher regarding ICT integration
(ii) Vision and Mission Statements	The ICT policy does not have a vision and mission statement
(iii) Goals	The ICT policy does not address the goals.
(iv) Minutes of meetings	ICT policy doesn't mention when meetings should be held.
(v) ICT-strategic plans	No ICT strategic plans available.
(vi) ICT-time tables	No ICT timetables available. The policy mention under heading Curriculum Development and Organisation that "*each class is allocated a time in the ICT suite. A weekly timetable is displayed within the ICT room for staff to sign up for additional time where appropriate."* The school could not produce this timetable to the researcher.
(vii) Budgets	No budget allocated mentioned in the ICT policy of the school
C: Equipment and resources	
Addressed in Table 5.1	

School have ICT equipment and resources available.	
D: Other	
(i) Purpose	The purpose of the ICT policy is clear, and it also mention for who this policy is intended for.
(ii) The school's aims for ICT-implementation	The aims are clearly stipulated in the ICT policy. E.g. • *To enable children to become autonomous, independent users of ICT, gaining confidence and enjoyment from their ICT activities.* • *To develop a whole school approach to ICT ensuring continuity and progression in all strands of the ICT National Curriculum*
(iii) The school's curriculum organisation	Is available in the ICT policy. Words like KS2 are being used, which are used in England, Key Stage 2 (KS2) is the term used to refer to the second stage of a child's primary education. The school used an ICT policy from England to draft their own.
(iv) Curriculum Management	Not mention in ICT policy
(v) Curriculum Enhancement	Not mention in ICT policy
(vi) Access to ICT	This is addressed under the heading, Effective and efficient deployment of ICT resources. The policy indicates that teachers and learners have access to ICT resources, it is also clear from an extract in ICT policy*, "we aim extend the availability of ICT equipment..."*
(vii) Inclusion	Inclusion is address in ICT policy, extract in ICT policy: *"We recognise ICT offers particular opportunities for pupils with special educational needs and gifted and/ or talented children..."*
(viii) Recording, assessment, and reporting	Available in the ICT policy.
(ix) Monitoring and review	Available in the ICT policy.
(x) Health and Safety/Security	Health and Safety is address in policy, "*school will operate all ICT equipment in compliance with Health and Safety reequipments."*
(xi) Copyright and licensing	Copyright and licensing not addressed as a heading in policy. Although software licensing is mentioned in the effective and efficient deployment of ICT resources heading.
(xii) Does it provide useful guidance for the ICT co-ordinator, headteacher, parents, governors, staff?	The ICT policy stipulates the roles and responsivities of: • *School Management Team (SMT)* • *ICT Coordinator* • *The Subject Coordinator* • *The classroom teacher* The draft of an ICT policy should include a number of stakeholders that will take ownership in the implementation process of ICT.

School 1 has an ICT-related policy, but has not used the provincial ICT policy to shape the school policy. There was no evidence of the National ICT-policy. In terms of leadership and management, the data showed that the policy does not make provision for the professional development. There is no evidence of meetings and strategic plans. There are also no ICT-time tables available, although the observations showed that weekly timetable is available in the staff room. There is no budget in the ICT policy of the school. It was noted that the purpose and aims for ICT-implementation was clearly outlined in the policy. Some terms- such as KS2 which is used in England- are used in the policy, which creates the impression that policies related to English schools were used in drafting their policies. The data showed also that there is no indication of curriculum enhancement and management in the policy, while issues pertaining to access have been addressed. Aspects such as inclusion, recording, assessment, reporting are tables in the ICT-policy. The findings showed also that health and safety issues have been addressed, as well as copyright and licensing. The policy at this school provides some indications of the role of SMT, ICT-coordinator, subject coordinator and classroom teacher.

Table 5.6: ICT policy of School 3: Analysis of ICT policy

Description	Comments
A: ICT-related policies	
(i) ICT policy of the schools	School is in possession of an ICT policy.
(ii) Provincial ICT-policy	School did not use Provincial ICT-policy when drafting an ICT-policy for the school.
(iii) National ICT-policy	
B: Leadership and Management	
(i) Professional Development: Teachers	The ICT policy doesn't make provision for professional development for teacher regarding ICT integration.
(ii) Vision and Mission Statements	The ICT policy does not have a vision and mission statement.
(iii) Goals	The ICT policy does not address the goals.
(iv) Minutes of meetings	ICT policy doesn't mention when meetings should be held.
(v) ICT-strategic plans	No ICT strategic plans available.
(vi) ICT-time tables	No ICT timetables available.
(vii) Budgets	No budget allocated mentioned in the ICT policy of the school

C: Equipment and resources	
Addressed in Table 5.1 School have ICT equipment and resources available.	
D: Other	
(i) Purpose	The purpose of the ICT policy is clear, and it also mention for who this policy is intended for.
(ii) The school's aims for ICT-implementation	The aims are clearly stipulated in the ICT policy. E.g. • *To achieve computer literacy among all teachers and learners.* • *Empower learners to acquire the knowledge, skills attitudes and values reacquired to operate confidently in the environment in South African community and to respond to the challenges of the economy.*
(iii) The school's curriculum organisation	Not mention in ICT policy
(iv) Curriculum Management	Not mention in ICT policy
(v) Curriculum Enhancement	Not mention in ICT policy
(vi) Access to ICT	This is addressed in the ICT policy, *"personal use of computers are acceptable as long as it does not interfere with normal activities, it is provided as a learning tool."*
(vii) Inclusion	Not mention in ICT policy
(viii) Recording, assessment, and reporting	Not mention in ICT policy
(ix) Monitoring and review	Not mention in ICT policy
(x) Health and Safety/Security	Not mention in ICT policy. But rights and responsibilities of teachers and learners and produces are addressed.
(xi) Copyright and licensing	Copyright and licensing not addressed as a heading in policy.
(xii) Does it provide useful guidance for the ICT co-ordinator, headteacher, parents, governors, staff?	The ICT policy stipulates the roles and responsivities of: • *Teachers* • *learners* The ICT policy provide guidance for teachers and learners when it comes to their rights and responsibility when using ICT resources in the school.

School 3, which is also a quintile 1-3 school, is in possession of an ICT-policy, and has also not been using the provincial ICT-policy when drafting an ICT-policy for the school. As was the case with school 1, the policy does not make provision for professional development for the teacher regarding ICT-implementation. The policy

does not include vision, mission statement, goals, minutes, minutes of meetings, ICT-strategic plans and ICT-time tables.

Table 5.7: ICT policy of School 9: Analysis of ICT policy

Description	Comments
A: ICT-related policies	
(i) ICT policy of the schools	School does not have an ICT policy but have policies that can influence the implementation of ICT at the school. • Bullebakkery-en Kuberbullebakkery beleid. (Bullying and Cyber Bullying Policy). • Beleid oor geslotekring television (Closed circuit television policy) • And an ICT submission working document.
(ii) Provincial ICT-policy	N/A
(iii) National ICT-policy	N/A
B: Leadership and Management	
(i) Professional Development: Teachers	The training of teachers in ICT is available in the ICT submission working document of the school. There is quite several courses for teachers, e.g. Pickers, Denvor, programming Hub to name a few.
(ii) Vision and Mission Statements	N/A
(iii) Goals	N/A
(iv) Minutes of meetings	N/A
(v) ICT-strategic plans	ICT strategic plans are available in the ICT submission working document. The document names the members of the ICT committee. The objectives regarding ICT, that can be seen as the schools ICT strategic plans. • Volkskool • Robotics and programming • Tech-Room • Training of teachers
(vi) ICT-time tables	No ICT time tables available.
(vii) Budgets	No budget allocated mentioned
C: Equipment and resources	
Addressed in Table 5.1	

School have ICT equipment and resources available.	
D: Other	
(i) Purpose	N/A
(ii) The school's aims for ICT-implementation	N/A
(iii) The school's curriculum organisation	N/A
(iv) Curriculum Management	N/A
(v) Curriculum Enhancement	N/A
(vi) Access to ICT	N/A
(vii) Inclusion	N/A
(viii) Recording, assessment, and reporting	N/A
(ix) Monitoring and review	Available in the ICT policy
(x) Health and Safety/Security	Health and Safety is partially addressed in the two policies. • (Bullying and Cyber Bullying Policy). • (Closed circuit television policy)
(xi) Copyright and licensing	N/A
(xii) Does it provide useful guidance for the ICT co-ordinator, headteacher, parents, governors, staff?	The school don't have a formal ICT policy but make use of other policies to guide them with ICT integration.

This high quintile school, school 9, does not have ICT-policies, but have policies that relates to ICT such as cyber bullying and closed-circuit television policy. The have shared an ICT-submission document. An interesting finding was that the training of teachers is included in the working document, with several courses, such as Pickers, Denvor, programming Hub to name a few. The documents showed no vision and mission statement, as well as set goals. Also, there were no evidence submitted of meetings. The principal presented ICT-strategic plans, with strategic plans in an ICT submission working document. It included also the members of the ICT- committee. The data showed that objectives are available, with no ICT timetables and budgets available. The documents provided show no purpose, aims for ICT-implementation, the school's curriculum management and enhancement processes, access to ICT and inclusion. Furthermore, the findings revealed that there is no evidence of recording, assessment and reporting, as well as monitoring and review. Health and safety is partially addressed in the bullying and cyber policy, as well as the closed circuit

television policy. There is not an inclusion of copyright and licensing, while the school does not have a formal ICT-policy. The school makes however use of other policies to guide them with integration.

5.5.1 Comparison and analysis of the policies

The data obtained from the document analysis from the quintile 1-3 schools, clearly shows that these schools are lacking well-designed policies for ICT-implementation in schools. This finding emanated also during the interviews (cf. 5.4.3.2). The data displayed that although there are signs of professional development conducted, it is minimal (cf. 5.4.1.3), with clear descriptions of how and what this professional development entails evident. There is a few, if any leadership and management actions evident in the documents provided from all the three schools. For example, the findings revealed that across the three schools the policies were incomplete, and that the policies lack rigour in terms of strategic plans, aims, goals and regular meetings (cf. 2.5). There is no indication that other members of the SMT plays a role, while the instructional role of the principal at all the three schools are not reflecting (cf. 5.4.4.6).

The data also showed that principals perform a minor role in curriculum enhancement and management. The lack of attention to this aspect, as well as the little attention to the instructional component, is a concern factor, due to the centrality of the principal's leadership and management role in teaching and learning. The absence of clear vision and mission statements on ICT-implementation in particular (cf. 3.5.1), supports the idea that the schools are disorganised and poorly led regarding ICT. Albeit the ICT-policies are lacking, evidence was found of aspects that relates to the policy such as strategic plans and other working documents.

In studying the policy of the one quintile 4-5 school that was involved in the study, some positives were picked up. For example, it showed evidence of policies that relates to ICT, and training of teachers with some courses that were indicated. This finding is congruent with the findings of the interviews, which also found that some quintile 4-5 schools rely on training for improvement of ICT-skills (cf. 5.4.5.2) However, it seems clear that- as is the case with quintile 1-3 schools- is the lack of attention to the policy that the principals give in terms of leadership and management of instruction, access and inclusion. The data displayed that there is no alignment and

inclusion in terms of recording, assessment and reporting as well as monitoring and review. The policies at both the schools are telling us very little about the management of infrastructure, budgeting, etc.

5.5.2 Summary of the data from documentary analysis

The documentary analysis demonstrated that both the quintile 1-3 and 4-5 schools, that rigorous policy implementation in terms of ICT is lacking. The data demonstrated clearly that the role of the principal is not featuring in terms of management and leadership. Consequently, schools are not addressing the needs in terms of policy implementation very well.

CHAPTER 6
SUMMARY OF MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

Chapter 5 comprised the presentation, discussion and analysis of the qualitative data findings gathered per the methodology outlined in Chapter 4. This concluding chapter summarises all five preceding chapters, thereby illustrating the connection between the study's background, the study, the purpose of the study, the research questions, the conceptual and theoretical framework, the literature review, the research methodology, and the presentation of the findings. Thereafter, the findings are synthesised, and the key findings are highlighted, with recommendations made for improving ICT implementation. The chapter concludes with suggested areas for future research that emanated from the findings, the limitations of the study, and the conclusions.

6.2 SUMMARY OF THE CHAPTERS IN THE THESIS

6.2.1 Chapter 1: Orientation to the Study

Chapter 1 outlined the reasons for which this study was undertaken, starting with an introduction and background to the project. The conceptual and theoretical framework, the research methods, and the background literature were all covered in detail. The purpose of the study was illuminated by highlighting the main and sub-questions. This chapter also included the issues about ethics and ensuring the trustworthiness of the research. The chapter concluded with a summary and an outline of the chapters of the entire thesis.

The main question that the study responded to was as follows:

What are the roles of principals in implementing information and communication technologies across different school contexts*?*

This comparative study focused on the role of principals in different school settings, that is, quintile 1-3 schools on the one hand and quintile 4-5 schools on the other. In

addressing the main question, four secondary research questions were formulated around the main research question to guide the study:

- To what extent do barriers hinder the successful implementation of ICT in different school settings?
- What are the critical leadership duties and functions that principals perform in implementing ICT in various school environments?
- What are the critical management duties and functions that principals perform in implementing ICT in various school environments?
- Which strategies should principals use for successful ICT implementation across different school settings?

In summary, the first chapter of the study introduces the importance of education in society and the role of technology, specifically ICT, in shaping education. The impact of ICT on access and equity in education was discussed, together with the need for teachers and principals to embrace technological advancements. The chapter also highlighted the challenges faced in implementing ICT in schools and the role of principals in bridging the technological gap. The research questions and objectives of the study were outlined, along with the conceptual and theoretical framework and the literature review. The chapter concluded by discussing the research methodology, including the research approach, data collection methods, and ethical considerations. It emphasised the significance of the research in contributing to the successful integration of ICT in schools.

The following section will focus on the literature review on ICT implementation in education and the role of principals.

6.2.2 Chapter 2: Literature review part 1 and the conceptual framework of the study

The study has demonstrated that ICT implementation in schools is a wide-ranging process, focusing on goals and vision, infrastructure and resources, curriculum integration, equitable access and monitoring and evaluation, to mention but a few aspects. This process needs to be managed and led. The principal, as the designated leader, should provide that guidance. The researcher conducted a comprehensive literature review that focused on this role and compared it within the contexts of low

and high-quintile schools. Due to the comprehensiveness of the topic, the literature review comprised two chapters. The first section of the literature review explored the implementation of ICT in schools, focusing on the role of the principal. In this chapter, the researcher conceptualised ICT implementation (cf. 2.3) in schools and provided an overview of international perspectives and policies on ICT implementation (cf. 2.4). As the role of the principal encompasses both a management and a leadership component, the chapter elaborated briefly on what the management and leadership components entail (cf. 2.6). The conceptual framework drew from the PAM document (DBE, 2020) as well as from the Standard for Principalship (DBE, 2016), which are the two primary policy documents that guide the role of principals. The chapter also elaborated upon the management role of the principal in ICT implementation (cf. 2.6.5), which formed a vital part of the discussion on ICT implementation.

6.2.3 Chapter 3: Literature review part 2 and the theoretical framework of the study

Chapter 3 outlined the theoretical framework centred around leadership styles and their relevance to ICT implementation. This chapter included a discussion on resource constraint contexts (cf. 3.3), focusing on challenges related to infrastructure and teacher barriers (cf. 3.4). The contexts of quintile 1-3 schools were analysed together with the challenges related to resource constraint contexts. These included a lack of interest amongst teachers regarding the state of ICT infrastructure (cf. 3.2.3) and other related teacher barriers (cf. 3.4). Chapter 3 also referred to the barriers that were experienced in terms of leadership (cf. 3.4). This study furthermore focused very firmly on leadership approaches that address contextual challenges, especially in terms of ICT implementation. Instructional (cf. 3.5) and transformative leadership (cf. 3.2.3) approaches were described in this regard. The last part of the literature review described managing conditions for ensuring successful ICT implementation, focusing on the digital divide, training principals and their SMTs, and ensuring the presence of sound hardware and software (cf. 3.6.4).

6.2.4 Summary of Chapters 4 and 5

Chapter 4 discussed the methodological foundations of the research. The research design, methodology, research paradigms, and the nature of the study itself were addressed. This chapter also contains information about the target population, sampling techniques, data collection instruments, protocols, and ethical principles that were followed throughout the research process to make the participants feel valued and aware of the importance of the activity. Chapter 4 provides a detailed description of the steps that must be taken to ensure the study's trustworthiness-credibility, dependability, transferability, and confirmability. Chapter 4 established the study's guidelines, and Chapter 5 examined the information obtained from the document analysis and interviews.

Chapter 5 focused on the presentation, discussion, and analysis of the data. Included in this section was a description of the backgrounds of the participating schools (cf. 6.3.), the demographical data of the participants (cf. 6.4), and the findings that emanated from the data (cf. 6.5).

6.3 BACKGROUND OF THE PARTICIPATING SCHOOLS

This study investigated the background of nine schools in Motheo and Xhariep District, Free State province, focusing on implementing ICT in education as part of the data collection process. The schools were classified as low-ranking quintile schools (quintiles 1-3), schools in low-income neighbourhoods, and high-ranking quintile schools (quintiles 4-5), schools in high-income neighbourhoods. Learner enrolment is higher in quintile 1-3 schools, with schools 1 and 4 having smaller enrolments. The number of teachers employed at each school was also analysed, with the average ratio of learners per teacher being 31 in quintile 1-3 schools. The School African Schools Act (DBE, 1996) permits public schools to hire additional educators, but budget constraints and a growing need for teachers may limit the number of teachers employed. The South African government categorises public schools into five quintiles based on socioeconomic status and access to education. Schools 1-5 in this study were low quintile (quintile 1-3), while schools 6-9 were high quintile (quintile 4-5). This study aimed to analyse the principals' use of ICT in the different quintile schools. Schools 1-5 were in impoverished rural areas, with 2-5 having locked computer

laboratories. Schools 3-4 had fully equipped computer laboratories, but neither teachers nor students used them. Schools 5 and 6 had outdated computers and outdated ICT infrastructure. The study reveals that all schools had ICT infrastructure, but the number of resources was insufficient for most learners. Schools in quintiles 1-3 had limited resources, with School 2, for example, having 1792 learners with one computer lab, 67 computers, and interactive whiteboards. Schools in quintiles 4-5 had comparatively more resources, such as 84 computers, 45 data projectors, televisions, and digital cameras. However, these resources are still insufficient for most learners, highlighting the need for more facilities.

6.4 DEMOGRAPHICAL DATA OF PARTICIPANTS

The study involved 56 teachers from nine participating schools, with 65 participants. The data shows that four of the nine principals were male, and five were female. The data also shows that there were more female teachers than males, which also reflects the situation in South Africa, where female teachers are more numerous than males. However, female teachers are underrepresented in leadership positions. The age of the teachers was also significant, with four out of nine principals aged between 20 and 35 and three out of these four being in quintile 1-3 schools. Additionally, the research reveals that there was no age limit on the usage of ICT in the classroom.

The study reveals that the average teaching experience of principals in South Africa is twenty years, with only three of the participants in the survey having more than ten years of experience. Most teachers had at least five years of experience, with a significant difference between the schools in the different quintiles. The study also highlights the importance of experienced teachers in guiding teachers in integrating ICT in the classroom. Most principals in the quintile 1-3 schools possessed formal educational management qualifications, while only 50% of principals in the quintile 4-5 schools had formal management qualifications. However, it is unclear whether this qualification enhances the leadership and management skills of teachers implementing ICT in the classroom. Most principals have a basic understanding of ICT but need assistance learning how to use new technology. For effective integration into teaching and learning, principals must receive training in technology leadership.

6.5 SYNTHESIS OF THE FINDINGS OF THE RESEARCH STUDY

The collected data was analysed according to four categories—the categories and themes emanating from the data aligned with the study's research questions.

6.5.1 CATEGORY 1 - Related to research question 1: To what extent do barriers hinder the successful implementation of ICT in different school settings?

The findings reveal that principals utilise computers for various purposes, including administration, WhatsApp, e-mails, the typing of e-mails, letters, the internet, meetings and many others (cf. 5.4.1.2). This demonstrates that principals of both quintile 1-3 schools and those of quintile 4-5 schools are more than capable of utilising ICT for their duties. This promotes ICT implementation. However, one worrying finding from the data is that most principals have not had formal ICT training (cf. 5.4.1.3). This is the case in both quintile categories and could hinder understanding and the effective implementation of ICT leadership. Added to this unfortunate situation is the absence of a formal in-service ICT training programme. Where a formal, agreed-upon programme is absent, there is nothing to implement, monitor or evaluate. A pleasing finding, on the other hand, is that some principals arrange workshops with a focus on various aspects of ICTs, such as the online platform Moodle, PowerPoint presentations, Excel, and smartboards (cf. 5.4.1.3). Although this was the case at some schools, it is interesting to note that training is still greatly desired, especially in software programs, technical skills, and in how to work with devices in the classrooms of quintile 1-3 schools (cf. 5.4.1.4). This a sign that principals do not address this need. Another positive finding that emanated from the data is that teachers support one another with ICT tools and programmes, especially in quintile 4-5 schools (cf. 5.4.1.3). It is common knowledge that learners nowadays are extremely interested and knowledgeable in the ICT field. Therefore, it was not strange that teachers regarded their ICT skills as insufficient, as they may have realised how skilled the 21st-century learner is with technology. This has a significant influence on principals. Therefore, there is a need for more training (cf. 5.4.1.4). However, principals do not supervise instruction (as instructional leaders), nor do they take the lead in designing programmes to address classroom issues.

Section 5.4.4.2's findings show that teachers recognise ICT's importance in teaching and the educational curriculum. The data shows, however, that there is minimal engagement between principals and teachers and that teachers' initiatives are mainly due to their own efforts (cf. 5.4.4.2). The findings reveal that teachers in both quintiles utilise a wide variety of ICT tools and interesting, modern teaching approaches, such as videos, coding and robotics. The researcher got the impression that teachers "run" with ICT implementation without rigorous support from the principals (cf. 5.4.2.3). It can be concluded that teachers are interested in the use of ICT also because ICT is particularly relevant in today's world. They have undoubtedly realised the importance of it and that it is a beautiful way to ensure learner involvement during lessons. Teachers in both quintile 1-3 schools and quintile 4-5 schools regard the availability of hardware and software as a significant advantage (cf. 5.4.2.3). It can be assumed that teachers realise the importance of working with hardware and software in delivering their programmes. Another interesting finding from the data was the excellent collaboration amongst teachers in the quintile 1-3 schools. This was also the case at quintile 4-5 schools. This is most likely a result of teachers' interest in ICT as a teaching and learning tool. It was reported that at both types of schools, teachers find it problematic when principals don't support them (cf. 5.4.2.4). The participants from quintile 1-3 schools mentioned that there is much room for improvement in terms of leadership support (cf. 5.4.2.5). The lack of policy implementation at each of the participating schools was one of the study's most notable findings. This can be regarded as a severe barrier to ICT implementation. Schools lack policies and clear guidelines for the implementation of ICT. It is possible that schools do not realise the importance of tailor-made policies for ICT implementation. This should be regarded as one of the main reasons why schools are not driving ICT implementation in a well-organised manner. Infrastructure barriers pose another threat to successful ICT implementation. Although schools in the lower quintiles have good equipment, safety, network, and non-usage issues are highly problematic.

Consequently, it frustrates teachers and hampers satisfactory ICT implementation. An alarming finding from the data was that children at these schools are unfamiliar with ICT tools. Other barriers include load shedding (at quintile 1-3 and 4-5 schools). This is a nationwide problem currently in South Africa but may add to the frustration. The interruptions to electricity supply at certain times may impede the teaching and

learning process. The lack of accessibility (at quintile 1-3 schools) to equipment is another barrier and shows that principals do not manage the process well. Other concerning barriers this study highlighted at quintile 1-3 schools are outdated laptops and insufficient internet connectivity and speed. This may also be ascribed to a lack of funds to ensure improved infrastructure, while it points once again to poor management and leadership.

6.5.2 CATEGORY 2 - Related to research question 2: What are the critical leadership duties and functions that principals perform in implementing ICT in various school environments?

The findings reveal that teachers from low-quintile schools emphasised the importance of ICT in adapting to curriculum changes and the challenges posed by the COVID-19 pandemic, which led to increased reliance on online learning. Teachers from the higher-quintile schools acknowledged the benefits of ICT, such as its ability to prepare learners for the future and ease administrative tasks like capturing marks. The findings suggest that principals should act as change agents and instructional leaders, embracing educational innovations and providing leadership in online methodologies to navigate the changing educational landscape. There is a significant difference between well-resourced schools that can effectively use ICT and those that cannot. Principals as transformative leaders need to ensure well-resourced ICT spaces in schools to promote creativity, enhance instructional strategies, and prepare learners for a technologically advanced world. Teachers in quintile 1-3 schools use ICT tools like whiteboards, laptops, and smartphones for interactive learning. Quintile 4-5 schools also utilise ICT tools for teaching, including videos and PowerPoints. Common ICT tools used by teachers in schools for instruction include interactive whiteboards, laptops, tablets, smartphones, data projectors, computers, speakers, Chromebooks, PowerPoint presentations, videos, Google Earth, pictures, YouTube videos, songs, research tools, counting tools, games, and various software applications.

Integrating ICT tools in education improves motivation, recall, new instruction stimuli, activating responses, receiving systematic feedback, practising appropriately, sequencing learning, and locating viable sources of information. Teachers in quintile 1-3 schools collaborate to troubleshoot ICT issues and share resources. Skilled ICT

teachers support less skilled colleagues, fostering innovation. Transformative leaders promote collaboration and problem-solving for effective ICT use. Quintile 4-5 schools provide assistance and training for struggling teachers. Teachers in quintile 1-3 schools collaborate by actively engaging with each other to troubleshoot technical problems, share resources, and exchange ideas on integrating technology effectively into their teaching practices. Skilled ICT teachers support less skilled colleagues, and ICT committee members assist less skilled teachers. Teachers who innovate in pedagogy, train their peers, and challenge traditional roles most effectively tend to utilise technology. Collaboration among teachers, supported by skilled ICT teachers and principals, enhances professional development and fosters a culture of problem-solving and innovation in educational settings. Teachers at quintile 1-3 and quintile 4-5 schools acknowledged the need for further ICT integration in classrooms. Five teachers highlighted the necessity for teacher training in ICT. Transformational leaders who implement ICT in schools exhibit a continuous drive for improvement. Teachers at quintile 1-3 and quintile 4-5 schools acknowledged the need for further ICT integration in classrooms. Five teachers highlighted the necessity for teacher training in ICT. Teachers at quintile 1-3 and quintile 4-5 schools acknowledged the necessity for further development regarding ICT integration in the classroom. This need was highlighted by five teachers from different quintiles, emphasising the importance of teacher training in ICT to integrate technology into teaching and learning practices effectively. The documentary analysis confirmed the consensus among teachers regarding the need for ICT integration in classrooms across different school quintiles. School principals need to be knowledgeable about research and evidence-based practices to enhance teaching and learning, enabling them to make informed decisions. This knowledge also helps principals align educational goals with school requirements, ensuring a cohesive approach to improving teaching and learning outcomes.

Principals play a crucial role in ICT implementation in schools. Teachers' ICT capabilities vary, with younger teachers showing more proficiency. Principals need to motivate and encourage teachers to use ICT effectively. Professional development is essential to address teachers' ICT skill limitations. Principals in higher quintile schools have more success in motivating teachers. Leadership approaches vary, with some principals lacking clear strategies. SMT members have a limited role in ICT leadership,

with some schools lacking influential ICT committees. Principals in schools categorised in quintiles 1-3 acknowledged a lack of motivation and encouragement toward teachers to incorporate ICT in their instructional practices. They realise the importance of motivating and encouraging teachers to use ICT but admit that they do not effectively do so. Some principals rely on the DoE for ICT teacher training opportunities but noted that not all teachers were eager to attend these sessions. Teachers faced challenges such as a lack of planning, enthusiasm, and negative attitudes towards ICT, which hindered their effective use of technology in the classroom. Some teachers experienced burnout and may not have received adequate support or encouragement to integrate ICT into their teaching practices.

Additionally, older teachers may resist embracing new technologies due to a lack of training and familiarity with ICT tools. Teachers in schools categorised in quintiles 1-3 felt they received sufficient support from the School Management Team (SMT) for integrating ICT in the classroom. However, they did not indicate precisely what this support entailed. Some teachers mentioned that expert teachers within the school assisted them more as managers than the SMT, providing direct guidance on ICT integration.

6.5.3 CATEGORY 3 - Related to research question 3: What are the critical management duties and functions that principals perform in implementing ICT in various school environments?

Principals play a crucial role in planning and supporting ICT implementation in schools. Lack of clear strategies and goals for ICT in low-quintile schools is evident. Principals need to support teachers in integrating ICT effectively into classrooms. Communication of ICT goals and vision to staff is essential, but this is lacking in some schools. Monitoring the proper use of ICT and managing hardware, software, and infrastructure are vital responsibilities. Principals in higher-ranked schools provide better support for ICT than those in lower-ranked schools. Principals should ensure efficient management of ICT resources for successful implementation. School principals can effectively support teachers in planning and integrating ICT in the classroom by providing resources, training, and ongoing support. They should communicate the school's ICT goals and vision to staff, involve teachers in setting

goals, and encourage collaboration. Principals should ensure teachers access necessary technological tools, software licenses, and technical support to enhance student engagement and achieve curriculum goals. Communication and involvement of teachers in setting goals, visions and missions regarding ICT implementation in schools are crucial for successful integration. When principals effectively communicate and involve teachers in the planning process, it increases teacher buy-in and commitment to using ICT in the classroom. This collaborative approach fosters a supportive environment, enhances teacher confidence in using technology, and ultimately leads to more effective ICT integration for improved educational outcomes. Involving teachers in setting goals and visions for ICT implementation is essential as it fosters a sense of ownership and commitment among teachers. When teachers are involved in planning, they are more likely to be motivated and engaged in implementing ICT effectively in their classrooms. This collaborative approach also ensures that the goals and visions set are realistic, relevant to the needs of the teachers and students, and aligned with the school's overall mission.

6.5.4 CATEGORY 4 - Related to research question 4: Which strategies should principals use for successful ICT implementation across different school settings?

Principals need to support teachers in planning and integrating ICT in the classroom. Schools in quintiles 4-5 have better ICT support than those in quintiles 1-3. Principals should provide training and resources, and they should monitor progress. Principals should communicate ICT goals and vision clearly. Lack of interest in ICT by some principals and resistance from older teachers hinders efficient ICT implementation. Collaboration and involvement in setting goals are imperative. Principals should promote technology integration and monitor progress effectively, ensuring clear guidelines and policies for ICT implementation and use. Principals should manage ICT hardware, software, and budget effectively. Schools in quintiles 4-5 have better ICT infrastructure and support; however, all principals should ensure proper ICT infrastructure and budget allocation. Monitoring, evaluation, communication, and collaboration are critical for successful ICT implementation. Principals can enhance teaching and learning through technological advancements by prioritising technology, communicating its significance to teachers, providing training and resources for ICT

integration, monitoring progress, fostering a culture of collaboration among teachers, involving stakeholders, setting clear ICT goals, updating policies regularly, and ensuring effective communication and support for teachers in utilising technology to support curriculum goals and enhance student engagement.

In summary, principals face challenges in communicating ICT goals and vision to staff due to a lack of interest in ICT, resistance from older-generation principals and teachers, contextual challenges in low-income schools, limited resources allocated to ICT initiatives, outdated equipment, restricted access to digital tools, time constraints, discomfort with new ICT methodologies, and the need for principals to show dedication to ICT implementation and provide passionate assistance to overcome resistance and promote effective communication of the vision, mission, and goals of ICT initiatives. Efficient administration of ICT gear and software in schools can significantly influence educational outcomes by enhancing digital literacy, promoting stakeholder collaboration, improving operational efficiency, ensuring cost-effectiveness, adapting to technological changes, and supporting teaching and learning processes.

6.6 RECOMMENDATIONS FOR THE IMPROVEMENT OF PRACTICE

6.6.1 Recommendations based on the findings of Category 1: Barriers that hinder ICT implementation (aligned with research question 1) - To what extent do barriers hinder the successful implementation of ICT in different school settings?

- Principals and SMT members at quintile 1-3 and 4-5 schools should receive formal, continuous training in ICT implementation, as most of them could not pinpoint specific strategies they employ to lead and manage ICT implementation at schools.
- It is strongly recommended that schools be supported in developing a formal ICT programme. In addition, such programmes should be scrutinised to include planning, implementation, monitoring, and evaluation functions.
- It is recommended that principals and SMT members as instructional leaders be also trained on 21st-century ICT approaches, emphasising approaches tailored to the needs of quintile 1-3 schools.

- Encourage participation in online courses and webinars that cover the latest educational technologies and their applications in school management.
- Create a network of principals who can share best practices, challenges, and solutions for ICT integration in schools.
- Although the ICT infrastructure is sound at many schools, the need for security measures should be prioritised, especially at quintile 1-3 schools. It is also recommended that hardware and software should be updated and replaced regularly.
- Conduct a Comprehensive Needs Assessment to evaluate current organisational resources, identify operational efficiency gaps, and engage stakeholders to understand perceived barriers, especially at low-quintile schools.
- Implement clear communication protocols and utilize collaborative tools to ensure efficient information flow across all organizational levels and facilitate real-time team communication.
- Invest in ongoing training programs to equip teachers with the necessary skills and knowledge and foster a culture of continuous learning to adapt to changing resource needs.
- Implement strategic planning processes to prioritize resource allocation based on organisational goals and utilise data analytics to monitor utilisation and adjust allocations as needed.
- Adopt a supportive organisational culture by promoting an inclusive environment, empowering teachers to voice resource limitations, and encouraging teamwork and collaboration across departments.
- Develop transparent, accessible, and standardised resource management procedures, regularly reviewing and updating them based on staff feedback.
- There is good evidence of collaboration among teachers; therefore, it is recommended that this approach be strengthened through professional learning communities.
- Regularly evaluate the effectiveness of resource-overcoming strategies by setting up metrics and conducting regular reviews and adjustments based on performance data and employee feedback.

- Support principals in promoting an environment that encourages innovation and flexibility in school resource management.
- One significant finding that this study highlights is the lack of leadership. One of the challenges that was pointed out was that many principals did not lead ICT implementation. It is recommended that shared leadership practices with the SMT be enhanced.

6.6.2 Recommendations based on the findings of Category 2: Leadership duties and functions (aligned with research question 2) - What are the critical leadership duties and functions that principals perform in implementing ICT in various school environments?

- Integrating ICT into the curriculum design should fundamentally enhance learning outcomes across all subjects.
- Principals should be sensitised to offer continuous training and professional development opportunities for teachers to enhance their ICT skills, enabling them to effectively integrate technology into their teaching practices and stay current with the latest educational technologies.
- Principals should be trained to encourage the use of interactive learning tools like smartboards, educational software, and online platforms to enhance learner engagement, collaboration, and dynamic learning in lessons.
- Schools should be supported in implementing programs to foster digital literacy in learners from an early age, teaching them to navigate digital resources, critically evaluate information, and use technology responsibly.
- Principals should establish partnerships with educational technology companies or organizations to access innovative tools, training materials, and support services for improved school ICT integration.
- They should also encourage parental involvement in ICT education by offering resources and workshops to support children's learning through technology at home, promoting a cohesive approach between school-based instruction and home support.
- Implement professional development programs on ICT tools and methodologies tailored for teachers of all experience levels, including workshops, webinars, and online courses.

- Implement mentorship programs for experienced teachers to guide less experienced colleagues in integrating ICT into teaching practices, fostering a collaborative environment for sharing resources and strategies.
- Principals should ensure that teachers have access to technological resources like computers and educational applications for easy lesson planning and learner engagement.
- Principals should offer comprehensive technical support services to teachers, including dedicated IT helpdesks and on-site staff, and regularly update technology infrastructure to minimize downtime and ensure smooth lesson operation. In low-quintile schools, principals should search for support from external funding agencies.
- As part of their instructional leadership duties, principals should ensure the implementation and integration of ICT in the curriculum, promoting best practices and successful case studies.
- Implement feedback mechanisms for teachers to share experiences with ICT implementation, identify challenges and successes, and continuously enhance training programs and resource availability.
- Teachers should be trained to use ICT tools effectively, focusing on learner-centred learning and promoting collaboration through interactive platforms.
- Regularly assess the effectiveness of ICT tools in classrooms through surveys and assessments and involve teachers in the selection process to ensure they meet classroom needs.
- Principals should develop a compelling vision for ICT integration in the school curriculum, aligning with educational goals and demonstrating its potential to enhance teaching and learning.
- Principals should create a collaborative environment involving teachers and IT staff (use the DBE and the District) in implementing ICT initiatives, promoting shared decision-making processes and involving all stakeholders in planning and executing technology integration strategies.
- Principals should regularly assess the effectiveness of ICT initiatives using data-driven approaches, making necessary adjustments based on findings. Principals should be trained in using data-driven decision-making strategies for this to happen.

- Foster a culture of innovation by encouraging staff and learners to experiment with new technologies, recognising and rewarding their creative use to improve educational practices.
- Establish partnerships with local tech companies or educational organizations to enhance school ICT implementation by providing resources, expertise, and mentorship programs.
- Staying informed about emerging technologies in education can help principals make informed decisions about adopting new tools through conferences, webinars, and subscriptions.
- Lead by example by integrating technology into administrative tasks and communication with staff, students, and parents, demonstrating confidence in ICT to inspire others within the school community.

6.6.3 Recommendations based on the findings of Category 3: Management responsibilities and roles of principals (aligned with research question 3) - What are the critical management duties and functions principals perform in implementing ICT in various school environments?

- One of the most concerning findings of this study was the absence of policy implementation at all the participating schools. Principals should receive workshops on relevant ICT policies.
- SMT members should also be involved in formulating and implementing ICT policy. This will ensure that everyone takes ownership of the process.
- Circuit and curriculum managers should perform a stronger monitoring role, especially because equipment is sometimes unused.
- Outdated equipment should be replaced, and principals, together with the SMT, should be supported by the district office.
- More funds should be generated for ICT support.
- Develop a strategic plan outlining the goals and objectives for integrating ICT into the school curriculum, ensuring alignment with the institution's overall educational objectives.

- Establishing a collaborative environment among teachers, IT staff, and all involved is crucial for sharing best practices and resources in ICT implementation.
- The initiative promotes professional development by offering continuous training opportunities for teachers and encouraging participation in workshops, conferences, and peer observations.
- Implement assessment strategies to assess ICT integration's effectiveness in improving teaching and learning outcomes.
- Address digital equity by ensuring equal access to technology for all teachers and learners and develop programs for device lending or internet access solutions for teachers and learners.

6.6.4 Recommendations based on the findings of Category 4: Strategies for successful ICT implementation (aligned with research question 4) - Which strategies should principals use for successful ICT implementation across different school settings)

- A comprehensive needs assessment needs to be conducted to evaluate the current technological landscape, identify gaps in infrastructure, skills, and resources, and engage staff, parents and learners in their expectations from ICT implementation.
- Principals should embark on a process of creating a comprehensive strategic plan for the ICT implementation, outlining objectives and timelines.
- Principals should receive support in conducting thorough research on available technology solutions.
- Implement effective communication strategies and develop a structured approach to prepare the school for a change, addressing potential resistance to change.
- The District office should support principals in creating robust support systems (especially at low-quintile schools) by establishing technical support teams to assist staff.
- The process involves regularly evaluating progress against established benchmarks and gathering user feedback to identify areas for improvement.

- Principals should receive training on budgeting for long-term maintenance of ICT, software updates, and hardware replacements and develop ongoing evaluation strategies for technology effectiveness.

6.7 VALUE AND SIGNIFICANCE OF THE RESEARCH

The study aimed to explore the principal's role in implementing ICT in different quintile school settings. To this end, it has produced fresh perspectives on the digital divide that exists in schools in South Africa. The study informs school principals of leadership actions for providing sufficient ICT implementation strategies. It also offers guidance on managing conditions to ensure successful school ICT implementation. This could also lead to advancing knowledge in the existing fields of leadership and management and ICT studies.

Further, the information gathered during the study may provide school principals and teachers with a clear understanding of how schools, teachers and learners can benefit from the integration of ICT in their schools. The aim was to identify and address the challenges faced in implementing ICT in schools while establishing effective processes for its successful implementation. Moreover, the practical implications derived from this study may help inform decision-making and practice in ICT implementation.

Additionally, this information can support ICT integration initiatives and/or training programmes that help teachers advance their ICT proficiency and help principals learn how to manage and lead the ICT integration processes in their schools. This study fills a gap in research that has been overlooked in terms of comparing ICT implementation in schools in different school settings and the principal's role in this regard. To this end, a wide range of theories was explored in the leadership and management fields.

Overall, this study's value, contribution and significance lie in its potential to generate new knowledge about ICT implementation, address real-world problems, and foster innovation in terms of leadership and management practices.

6.8 RECOMMENDATIONS FOR FURTHER RESEARCH

- A possible avenue for further research may be to focus on the challenges that schools face regarding resource allocation, maintenance of resources and security.
- Another possible path for a research project is to investigate the instructional leadership role of principals in terms of support with pedagogical approaches in ICT.
- A study investigating strategies to apply management and leadership principles in ICT implementation will also add value to this field.
- Another possible study in this field may explore strategies to bridge the digital divide between quintile 1-3 schools and quintile 4-5 schools.
- A study on the evaluation and assessment of ICT implementation could evaluate the effectiveness of ICT implementation in schools. It could adopt a mixed-method design to assess the impact of ICT implementation on student achievement.

6.9 LIMITATIONS OF THE RESEARCH STUDY

The following limitations should be noted:

This study selected nine primary schools in the Motheo and Xhariep education districts. Consequently, the participants in this study do not represent the entire population of primary schools in the Free State province. Ideally, a more extensive selection of participants would have provided more insights regarding principals' and educators' opinions about ICT implementation in the different quintile-ranking schools. As a result, the findings cannot be regarded as necessarily valid concerning all schools. Research findings, however, are useful for principals who face similar challenges in similar contexts.

Additionally, not all schools purposefully selected could participate. Unfortunately, only nine schools participated out of the ten chosen initially. More demographic diversity in the sample, particularly among principals, may improve the understanding and allow for more generalisation about their involvement in integrating technology into the classroom.

6.10 CHALLENGES ENCOUNTERED DURING THE STUDY

During the data collection process, getting permission from the schools was difficult, as principals were extremely busy. I made numerous phone calls and sent many emails to explain my research and get permission to conduct research at their schools. Due to their hectic schedules, finding enough time to conduct interviews with the teachers and principals was equally challenging. Principals especially found it difficult to schedule appointments.

Due to schedule conflicts and extracurricular activities, I was forced to conduct the focus group interviews with teachers late after school. I visited some schools more than once to complete the interviews with principals and/or teachers. In several schools, particularly those in quintiles 1-3, determining the available ICT resources proved challenging, as ICT resources were kept in storage with other equipment. Some teachers were relatively reserved during the focus group interviews despite my persistent efforts to get them involved in the discussion.

6.11 PERSONAL REFLECTION

As I researched the leadership role that school principals play in helping schools embrace ICT, I was surprised by the sharp contrast between affluent and impoverished environments. It was a thought-provoking look at the challenges principals face in impoverished communities and their critical role in closing the digital divide.

I saw principals in poor settings confronted with limited resources, infrastructure, and technology access yet demonstrating determination and creativity in implementing ICT programmes. I noticed that principals faced challenges in implementing ICT in wealthier settings despite abundant resources. They focused on fostering innovation and encouraging teachers to explore new ways to integrate technology into lessons. The effective integration of ICT in both affluent and disadvantaged settings greatly depends on school principals' leadership, who foster innovative thinking and facilitate the effective use of technology in the teaching-learning process.

The study underlined the need for resilience, adaptability and vision in leaders and the necessity for customised approaches in various educational settings. The survey of the leadership role of school principals in implementing ICT emphasised the

significance of equity in ensuring that all students have equal access to ICT and their critical role in influencing educational results.

My investigation of the leadership responsibilities of school principals in implementing ICT has brought to light the difficulties and obligations they have in guaranteeing the smooth integration of technology into the classroom. A significant reflection is that inspirational leadership is essential in advancing classroom ICT implementation. Principals need to be clear about how technology can improve instruction and learning, and they should motivate others and promote its use.

I also realised that to convey the advantages of ICT successfully, it is vital to cultivate a collaborative environment, forge positive bonds with others, and establish a culture of ongoing learning. To effectively select and utilise ICT resources, principals must be highly experienced communicators and collaborators who stay current on the newest technological advancements. They should also use professional development opportunities to improve their digital literacy. Principals must also embrace new tools and approaches, be adaptive and flexible, and be willing to take measured risks to promote innovation and progress.

Finally, to ensure successful implementation in schools, principals must foster a climate of trust and support, give teachers the tools they need, and acknowledge their efforts. Research on the leadership roles school principals play in implementing ICT emphasises the variety of tasks they have, including support, flexibility, expertise, communication, and vision.

6.12 CONCLUDING REMARKS

This study explores the role of principals in implementing ICT in schools, highlighting its significant impact on teaching and learning over the past 50 years. The importance of teachers' ICT abilities in fostering active, collaborative, and integrative learning in the classroom and developing higher-order thinking, creative expression, and technology preparedness is also evident. The study compared schools in South Africa based on quintiles and global ICT adoption, comparing developed and less developed countries. The study has also shown that institutional regulations and management-leadership procedures must be carefully followed when implementing ICT in schools. The White Paper on e-Education (DBE, 2004) aims to transform learning and teaching

in South Africa by addressing ICT in education. However, challenges like the digital divide persist still. Successful implementation requires healthy cultures and forward-thinking leadership, with principals playing a crucial role in integrating ICT, fostering collaboration, and interacting with teachers, parents, and communities. The South African school principal's leadership and management role is influenced by factors such as teacher needs, contextual challenges, and the standard of principalship. This study emphasised the need for ICT implementation in schools and established a working ICT committee with the principal as an ICT champion to drive the school's ICT strategy plan. Schools should assist in developing and implementing an ICT policy. Principals aiming to introduce or enhance ICT integration in schools must comprehend the challenges they will encounter and approach them positively.

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APPENDICES

APPENDIX A: APPLICATION FOR TITLE REGISTRATION

UFS UV

Faculty of Education

23 January 2020

APPLICATION FOR TITLE REGISTRATION

Applicant: Persens, SH
Student Number: 2001097449
Discipline: Management and Leadership
Study Code: Doctoral (EDML9100)

Dear Ms Persens

Your registered title is as follows: *"A comparative study of principals' roles in the implementation of information and communication technologies"*

All of the best with your study.

Yours sincerely,

Prof Jan Nieuwenhuis
Chair: CTR committee

Ms CS Duvenhage
Secretary: CTR committee

APPENDIX B: ETHICAL CLEARANCE

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS UV

GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

26-Oct-2021

Dear Mrs Shireen Persens

Application Approved

Research Project Title:
A comparative study of principals' roles in the implementation of information and communication technologies (ICT)

Ethical Clearance number:
UFS-HSD2021/1009/21

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

Yours sincerely

Dr Adri Du Plessis
Chairperson: General/Human Research Ethics Committee

Dr Adri du Plessis
Digitally signed by Dr Adri du Plessis
Date: 2021.10.27 13:45:10 +02'00'

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APPENDIX C: LETTER OF APPROVAL FROM FREE STATE EDUCATION DEPARTMENT TO CONDUCT RESEARCH IN SCHOOLS

Enquiries: MZ Thango
Ref: Research Permission: S.H. Persens
Tel. 082 537 2004
Email: MZ.Thango@fseducation.gov.za

education
FREE STATE PROVINCE

84 Japie Neser Road
Uitsig
Bloemfontein
9301

Dear Mrs. S.H. Persens

APPROVAL TO CONDUCT RESEARCH IN THE FREE STATE DEPARTMENT OF EDUCATION

This letter serves as an acknowledgement of receipt of your request to conduct research in the Free State Department of Education.

Topic: A comparative study of principals' roles in the implementation of information and communication technologies.

1. **List of schools involved:** Credence Primary School, C&N Pmeisieskool Oranje, Eunice Primary School, Grey College, Heide Primary School, Jagersfontein Combined School, Kruitberg Primary School, P.T. Sanders Combined School, Tjhebelopele Primary School and Universitas Primary School.

2. **Target Population:** Ten Principals and seventy teachers at the selected schools.

3. **Period of research**: From the date of signature of this letter until 30 September 2021. Please note that the department does not allow any research to be conducted during the fourth term (quarter) of the academic year. Should you fall behind your schedule by three months to complete your research project in the approved period, you will need to apply for an extension. The researcher is expected to request permission from the school principals to conduct research at schools.

4. The approval is subject to the following conditions:

   4.1 The collection of data should not interfere with the normal tuition time or teaching process.

   4.2 A bound copy of the research document should be submitted to the Free State Department of Education, Room 101, 1st Floor, Thuto House, St. Andrew Street, Bloemfontein or can be emailed to the above mentioned email address.

   4.3 You will be expected, on completion of your research study to make a presentation to the relevant stakeholders in the Department.

   4.4 The ethics documents must be adhered to in the discourse of your study in our department.

5. Please note that costs relating to all the conditions mentioned above are your own responsibility.

Yours sincerely

09/07/2021

Mr. J.S. Tladi
Acting DDG: Corporate Services

DATE:

Enquiries: MZ Thango (Tel. 082 537 2654)
Ref: Research Extension Permission: S.H. Persens
Email: MZ.Thango@fseducation.gov.za

education
Department of Education
FREE STATE PROVINCE

84 Jagte Neser Road
Uitsig
Bloemfontein
9301

Dear Mrs. S.H. Persens

PERMISSION FOR AN EXTENSION TO CONDUCT RESEARCH IN THE FREE STATE DEPARTMENT OF EDUCATION: MOTHEO AND XHARIEP DISTRICTS

This letter serves to inform you that you have been granted permission for an extension to conduct research in the Free State Department of Education within the Motheo and Xhariep Education Districts. The details in relation to your research project with the University of the Free State are as follows:

Topic: A comparative study of principals' roles in the implementation of information and communication technologies.

1) **List of schools involved:** Heide Primary School, P.T. Sanders Combined School, Eunice Primary School, C&N Pmeisieskool Oranje, Universitas Primary School, Grey College, Tjhebelopele Primary School, Krulberg Primary School, Credence Primary School, Jagersfontein Combined School, Diamanthoogte Combined School and St. Michaels Girls School.

2) **Target population:** Ten Principals and seventy teachers at the selected schools.

3) **Period of research:** From the second week of February 2022 until 30 September 2022. Please note that the department does not allow any research to be conducted during the fourth term (quarter) of the academic year. Should you fall behind your schedule by three months to complete your research project within the approved period, you will be required to apply for an extension. The researcher is also expected to request permission from the school principals to conduct research at schools.

4) **Conditions:** Please note that the permission granted is subject to the following conditions:

- The collection of data must not interfere with the normal tuition time or teaching process.
- A bound copy of the research document must be submitted to the Free State Department of Education, Room 101, 1st Floor, Thuto House, St. Andrew Street, Bloemfontein.
- You will be expected, on completion of your research study to make a presentation to the relevant stakeholders in the Department.
- The ethics documents must be adhered to in the discourse of your study in our department.

5) **Financial implications:** Please note that costs relating to all the conditions mentioned above are your own responsibility.

We wish you all the best with your research project.

Yours in education

Mr. MZAMO W. JACOBS
DIRECTOR: QUALITY ASSURANCE, M&E AND STRATEGIC PLANNING

DATE: 30/11/2021

APPENDIX D: LETTER OF APPROVAL FROM FREE STATE EDUCATION DEPARTMENT TO CONDUCT RESEARCH IN SCHOOLS

Enquiries: MZ Thango
Ref: Notification of research: S.H. Persens
Tel. 082 537 2654
Email: MZ.Thango@fsedu cation.gov.za

education
Department of Education
FREE STATE PROVINCE

District Director
Motheo District
Xhariep District

Dear Mr. Moloi and Mr. Magwa

NOTIFICATION TO CONDUCT RESEARCH PROJECT IN YOUR DISTRICT BY S.H. PERSENS

The above mentioned candidate was granted permission to conduct research in your district as follows:

Topic: A comparative study of principals' roles in the implementation of information and communication technologies.

1. **List of schools involved:** Credence Primary School, C&N Pmeisieskool Oranje, Eunice Primary School, Grey College, Heide Primary School, Jagersfontein Combined School, Kruitberg Primary School, P.T. Sanders Combined School, Tjhebelopele Primary School and Universitas Primary School.

2. **Target Population:** Ten Principals and seventy teachers at the selected schools.

3. **Period of research**: From the date of signature of this letter until 30 September 2021. Please note the department does not allow any research to be conducted during the fourth term (quarter) of the academic year nor during normal school hours. The researcher is expected to request permission from the school principals to conduct research at schools.

4. **Research benefits:** This study will contribute to the development of a shared vision that can assist policymakers and education authorities to implement the integration of ICT into Free Sate schools successfully. Furthermore, it will provide guidance to school principals, SMTs and teachers on how they should play a more forceful role in leading the implementation of ICT in schools.

5. Strategic Planning, Policy and Research Directorate will make the necessary arrangements for the researchers to present the findings and recommendations to the relevant officials in the district.

Yours sincerely

Mr. J.S. Tladi
Acting DDG: Corporate Services

09/07/2021
DATE:

Enquiries: MZ Thungo (082 537 2024)
Ref: Notification of research extension: S.H. Persens
Email: MZ.Thungo@fseducation.gov.za

education
Department of Education
FREE STATE PROVINCE

District Director
Motheo District
Xhariep District

Dear Mr. Molol and Mr. Magwa

NOTIFICATION OF RESEARCH EXTENSION: PERMISSION TO CONDUCT RESEARCH PROJECT IN THE MOTHEO AND XHARIEP DISTRICTS

This letter serves to inform you that Mrs. S.H. Persens has been granted an extension to conduct research in the Motheo and Xhariep Districts under the auspices of the University of the Free State. The details in relation to their research project are as follows:

Topic: A comparative study of principals' roles in the implementation of information and communication technologies.

1. **List of schools involved:** Heide Primary School, P.T. Sanders Combined School, Eunice Primary School, C&N Pmeisieskool Oranje, Universitas Primary School, Grey College, Tjhebelopele Primary School, Krutberg Primary School, Credence Primary School, Jagersfontein Combined School, Diamanthoogte Combined School and St. Michaels Girls School.

2. **Target population:** Ten Principals and seventy teachers at the selected schools.

3. **Period of research:** From the second week of February 2022 until 30 September 2022. Please note the department does not allow any research to be conducted during the fourth term (quarter) of the academic year nor during normal school hours. The researcher is expected to request permission from the school principals to conduct research at schools.

4. **Research benefits:** This study will contribute to the development of a shared vision that can assist policymakers and education authorities to implement the integration of ICT into Free Sate schools successfully. Furthermore, it will provide guidance to school principals, SMTs and teachers on how they should play a more forceful role in leading the implementation of ICT in schools.

5. The Sub-directorate of Research & Policy will make the necessary arrangements for the researchers to present the findings and recommendations to the relevant officials in the Department.

Yours Sincerely

Mr. MZAMO W. JACOBS
DIRECTOR: QUALITY ASSURANCE, M&E AND STRATEGIC PLANNING

DATE: 30/11/2021

APPENDIX E: INFORMATION LEAFLET

RESEARCH STUDY INFORMATION LEAFLET AND PRINCIPAL CONSENT FORM

DATE

30 June 2021

TITLE OF THE RESEARCH PROJECT

A comparative study of principals' roles in the implementation of information and communication technologies

PRINCIPLE INVESTIGATOR / RESEARCHER(S) NAME(S) AND CONTACT NUMBER(S):

Shireen Basjan (Persens) *2001097449* *0716419277*

FACULTY AND DEPARTMENT:

Education
School of Education Studies

STUDY LEADER(S) NAME AND CONTACT NUMBER:

Dr Bernadictus Plaatjies (UFS staff member)
051 401 2955

WHAT IS THE AIM / PURPOSE OF THE STUDY?

The aim of this study is to address that how school principals implement the use of ICT in their schools. Comparative study will be used to find similarities and difference in how school principals determining his/her role in implementing ICT in schools. This comparative study will help with integration of ICT into schools, guidance to school principals in leading implementation of ICT in schools, improvement of teacher development, maintenance of ICT infrastructure.

WHO IS DOING THE RESEARCH?

I, Shireen Heleen Persens, am working at Maremalou Training Institute as Head of Department dealing with training teacher. I am currently doing my Doctoral degree in Education Management and Leadership under the supervision of Dr. B. Plaatjies. My study seeks to investigate the principals' role in the implementation of information and communication technologies (ICT).

HAS THE STUDY RECEIVED ETHICAL APPROVAL?

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

Approval number: UFS-HSD2021/1009/21

WHY ARE YOU INVITED TO TAKE PART IN THIS RESEARCH PROJECT?

This particular group of educators were selected because they are valuable to this study. The participants consist of post level one educators, SMT members and the principal of a primary school. These individuals deal with ICT integration in the school and inform the study on how they manage the implementation in their respective schools. The researcher will select ten primary schools in the Motheo and Xhariep District. The sample will consist of the principal, SMT member and post level educators. Thus, there will be seventy participants taking part in the research.

WHAT IS THE NATURE OF PARTICIPATION IN THIS STUDY?

The researcher will make use of individual, focus group interviews and observations to obtain information from the participants. The researcher will make use of audio taping to record the interviews. The taped recordings will them be transcribed verbatim. The researcher will also make use of document analysis, to specifically look at the ICT policy of the different schools. This data collection methods will allow the researcher to investigate and probe the responses of the different participants' interviews in order to acquire valuable information. The expected time for the interviews is thirty to thirty-five minutes per session. The questions asked in the interviews will be pertaining to implementation of ICT in schools.

CAN THE PARTICIPANT WITHDRAW FROM THE STUDY?

Participation is fully voluntary and there is no penalty or loss of benefit for non-participation. Being part of this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason. Participants will remain anonymous throughout the study and no participants' names will be disclosed. The researcher will treat all information pertaining to the research as confidential.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

This study will contribute to the development of a shared vision that can assist policymakers and education authorities to implement the integration of ICT into Free Sate schools successfully. It will provide guidance to school principals, SMTs and teachers on how they should play a more forceful role in leading the implementation of ICT in schools. It will also provide guidance to those responsible for the improvement of teacher development through intensive training programmes on the use and prioritization of ICT in the classroom.

WHAT IS THE ANTICIPATED INCONVENIENCE OF TAKING PART IN THIS STUDY?

There are currently no anticipated risks to the study, however, if such a risk may arise during the course of the study, I will make the necessary referrals.

WILL WHAT I SAY BE KEPT CONFIDENTIAL?

All information collected will be kept entirely confidential and will not be disclosed at any time. All the participants will receive full anonymity. Necessary measures will be taken by the researcher to ensure that no participant is harmed in any way by the research. The researcher will allow participants to view the letters of informed consent. Participants will also be allowed to have access to the permission letters granted by the respective Departments of Education, which allows me to conduct the research. These letters will serve as proof that permission would not have been granted if any unethical practices were involved. The researcher will also explain to the participants the significance of the forms from the Department of Education and the stipulations of what is allowed or not allowed during a research process. Participants will then also be briefed on the implications of the consent letter. The researcher will not record participants' names anywhere that will be able to connect them to the answers that they provide. Participants' responses will be given fictitious code numbers or pseudonyms and will be referred to in this way in the data, any publications, or other research reporting methods such as conference proceedings. Participants anonymous data may be used for other purposes, e.g. research report, journal articles, conference presentation, etc. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

HOW WILL THE INFORMATION BE STORED AND ULTIMATELY DESTROYED?

Hard copies of your answers will be stored by the researcher for a period of five years in a locked cupboard/filing cabinet in my home for future research or academic purposes; electronic information will be stored on a password protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. All copies of interviews will be destroyed after the project has been completed.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICPATING IN THIS STUDY?

Participants will not benefit financially from participating in the study No financial gain, cash of any kind will be rewarded to any participant

HOW WILL THE PARTICIPANT BE INFORMED OF THE FINDINGS / RESULTS OF THE STUDY?

If you would like to be informed of the final research findings, please contact Shireen Heleen Persens on 0716419277 or email shireenpersens@gmail.com. The findings are accessible for a year. Should you require any further information or want to contact the researcher about any aspect of this study, please contact Shireen Heleen Persens on 0716419277 or via email shireenpersens@gmail.com. Should you have concerns about the way in which the research has been conducted, you may contact Dr. B. Plaatjies on 051 401 2955 or via email at PlaatjiesBO@ufs.ac.za.

APPENDIX E: INFORMED CONSENT

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

PRINCIPAL CONSENT TO PARTICIPATE IN THIS STUDY

I, the undersigned,

_____ (*participant's full names to be included*), (the "**Participant**")

confirm that I voluntarily agree to participate in the research study referred to as the

_____ (the "**Study**") in relation to

_____

_____

and which Study is being conducted by

_____

(*insert the name of the researcher*), (the "**Researcher**").

I, the undersigned Participant, further confirm that–

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

APPENDIX F: INTERVIEW SCHEDULE FOR SEMI STRUCTURED INTERVIEWS WITH PRINCIPALS

SEMI STUCTURED INDIVIDUAL INTERVIEWS PRINCIPALS

TITLE: *A comparative study of principals' roles in the implementation of information and communication technologies*

The open-ended questions serve as a guide for the individual interviews with the principals. The researcher will allow for flexibility to obtain any new information. This will be done through probing and follow-up questions where necessary.

QUESTION 1: Computer Skills of principals

- How often do you use the computer?
- What do you use your computer for?
- Have you received formal training in ICT / computer literacy?
- Tell us more about the training in ICT, and what you have learned from it.
- How did training and your own professional development in the use of ICT enhance your skills in ICT?
- Which programs of the computer do you use readily?
- How would you describe your capabilities in the use of programs for teaching and learning?

QUESTION 2: The role of the principal in terms of ICT-professional development

- How would you describe the knowledge and capabilities of your teachers' ICT skills?
- Identify the weakness and strengths of your teachers' ICT skills.
- What do you do to address the weakness of your staff in terms of ICT skills?
- Explain the measures that you take to motivate/encourage teachers to use ICT in their Instructional practices.
- Which strategies do you use to motivate teachers to engage in ICT-professional development?

- Is there an ICT professional development program for teachers? Please share the goals of this training.
- While integrating ICT into teaching methods, how do you support your teachers in defining key factors?

QUESTION 3: **Leadership Role in terms of ICT- instruction**

- Define your leadership style?
- In your opinion, what should be the role of a leader in ICT integration in school?
- As the principal, what is your vision for ICT integration?
- How do you as the principals' support teachers in terms of the planning of ICT- lessons?
- Do you have a timetable that makes provision for periods in the computer room?
- In which subjects do learners get ICT-based instruction?
- How do you communicate your school's ICT- goals and vision to staff?
- Which ways of recordkeeping and monitoring are you using to ensure that teachers use ICT-based instruction on a daily basis?
- Which innovative practices have you implemented over the last couple o years in ICT?

QUESTION 4: Distributing duties to the SMT and teachers:

- What role do the members of the SMT play in providing leadership in ICT?
- Are there teachers that play a role in supporting other less skilful teachers?
- I so, how do they provide support?
- In your opinion, what are the skill levels of your SMT in ICT?
- How are their willingness and motivation to provide leadership and support to teachers?
- Did your SMT have the training and how did this help them to provide support?
- Which aspects of ICT support could be distributed to SMT- members or knowledgeable teachers?
- Provide your thoughts on how your SMT views the value of ICT instruction.

QUESTION 5: Leadership and management support regarding ICT

- What IT resources are available in your school?
- Does your school have an ICT policy? What do you think of the implementation of this policy?
- Identify the main players and their exact roles in introducing and supporting ICT in your school.
- Do you have a specific ICT strategy?
- Describe the strategies that you have implemented to ensure that your school is equipped with appropriate ICT infrastructure.
- What is your school's vision about the goals of ICT integration?
- How would you describe the culture and leading environments of your school?
- Are your vision and mission discussed and shared with the teachers?
- How do you involve the rest of the staff and the SMT in implementing the ICT-vision for the school?
- How do you and the SMT convey performance expectations in ICT?
- Do you provide appropriate models of individual support and intellectual stimulation to teachers?

QUESTION 6: ICT integration and a Community of Practice (COP)

- In your opinion, is it easy to integrate ICT into the teaching and learning process?
- What are the barriers to ICT integration with teaching and learning?
- How do your teachers integrate ICT into their teaching practices? Give a few examples?
- How do you support your teachers in defining the key factors while integrating ICT in their teaching?
- Do you have a COP to support the integration of innovations and change?
- How enthusiastic would you regard your teachers?
- How do COP support teachers in ICT-implementation?
- Do you have an ICT-integration plan?

APPENDIX G: FOCUS GROUP INTERVIEW SCHEDULE WITH TEACHERS

Focus Group Interviews
Teachers

TITLE: *A comparative study of principals' roles in the implementation of information and communication technologies*

The open-ended questions serve as a guide for the individual interviews with the teachers. The researcher will allow for flexibility to obtain any new information. This will be done through probing and follow-up questions where necessary.

QUESTION 1: ICT Usage in Teaching

- Which ICT tools are you using in your lessons?
- Can these ICT resources ensure effective teaching? Can you explain it in detail with examples?
- What problems do you face when using these ICT tools in the classroom?
- In what areas do you recommend that your school make changes so that teachers can effectively use ICT when teaching?
- Do your learners have the skills to use ICT effectively?

QUESTION 2: ICT Skills/Competency

- Have you received any professional training on ICT before? If so, can you describe the type of training?
- Do you have sufficient knowledge to use ICT equipment and software effectively and efficiently?
- Are there guidelines or policies for teachers to use ICT in this school?
- Do you have a computer at home? How often and for what purpose do you use them?
- Does it make your teaching more efficient?
- Do you think you are fully prepared to integrate ICT into your teaching?
- If you want to effectively integrate ICT into your teaching, what additional skills or knowledge do you need?

QUESTION 3: Educational Model

- Do you consider ICT teaching as a subject, or can it be effectively integrated into the teaching of other subjects? Can you give a reason for your answer?
- As a teacher, can you describe how to use ICT as an educational tool in teaching?

QUESTION 4: Impact of ICT Usage

- Based on your experience as a teacher, has the use of ICT changed the way you teach learners?
- Can you explain the various results of these changes?
- How important is ICT in curriculum and teaching?
- Is there a difference between the use of ICT in teaching and normal teaching without ICT? If so, why do you say that?
- How do you use ICT in teaching to promote learner's ability to acquire knowledge, use and understand the curriculum?
- When using ICT, how do you identify the performance standards for your subject?
- In your opinion, how does technology improve learners learning?

QUESTION 5: ICT INFRASTRUCTURE

- Does the ICT infrastructure meet the needs of your school to properly integrate ICT?
- Does your school have the necessary hardware and software to assist in the integration of ICT?
- When using ICT for teaching, what limitations have you encountered regarding the ICT infrastructure?
- Is technical assistance available during your lesson presentations? If so, how effective is it to the smooth running of your lesson?
- What changes do you suggest can be made to the school's ICT infrastructure so that teachers can use ICT effectively to teach

QUESTION 6: **SUPPORT FROM THE PRINCIPAL AND SMT**

- How does the principal support ICT instruction in the classroom?
- How do other members of the SMT support ICT in the classroom?

- In your opinion, are you involved in the development of the goals, mission, and vision statements relating to ICT?
- Can you please elaborate on how your views are being perceived by the principal in important discussions about ICT instruction?
- What is your view on how the principal support you in terms of the planning of lessons, record-keeping, etc?
- How is the quality of communication about ICT-related matters?
- Does the principal succeed in motivating and encouraging you to use ICT optimally in the classroom?
- What do you think can he/she do better to enhance ICT instruction?
- What do you think can he/she do to provide better support in terms of infrastructure and resources?
- Are there any contextual challenges?
- What should the principal do to address these contextual challenges?

APPENDIX H: DOCUMENT ANALYSIS

Document Analysis

ICT POLICY OF SCHOOL

SCHOOL: _____

DATE:

_____

TITLE: *A comparative study of principals' roles in the implementation of information and communication technologies*

Are there evidence presents of the following ICT-related aspects.

Description	Yes/ No	Comment
A: ICT-related policies		
(i) ICT policy of the schools		
(ii) Provincial ICT-policy		
(iii) National ICT-policy		
B: Leadership and Management		
(i) Professional Development		
(ii) Vision and Mission Statements		
(iii) Goals (iv) Minutes of meetings		
(v) ICT-strategic plans		
(vi) ICT-time tables		
(vi) Budgets		
C: Equipment and resources		
(i) Computer lab		
(ii) Number of computers		
(iii) Interactive white boards		
(iv) Printers		
(v) Projectors		
(vi) Television		
(v) Digital Cameras		

D: Other		
(i) Purpose		
(ii) The school's aims for ICT-implementation		
(iii) The school's curriculum organization		
(iv) Curriculum Management		
(v) Curriculum Enhancement		
(vi) Access to ICT		
(vii) Inclusion		
(viii) Recording, assessment, and reporting		
(ix) Monitoring and review		
(x) Health and Safety/Security		
(xi) Copyright and licensing		
(xii) Does it provide useful guidance for the ICT co-ordinator, headteacher, parents, governors, staff?		

Other relevant information

APPENDIX I: CHECKLIST 1: GENERIC CHECKLIST TO BE USED IN OBSERVATION OF SCHOOL PROFILE AND ICT INFRASTRUCTURE

OBSERVATION LIST

School profile and the ICT infrastructure

TITLE: *A comparative study of principals' roles in the implementation of information and communication technologies*

NAME OF THE SCHOOL (CODE)	QUINTILE RANKING	LEARNER ENROLEMENT	ICT Infrastructure (Equipment and resources)							
			Number of TeacherPost	Computer lab	Number of computers	Interactive white boards	Printers	Projectors	Television	Digital Cameras
COMMENTS ON ABOVE ASPECTS										
GENERAL COMMENTS										

APPENDIX J: LETTER FROM LANGUAGE EDITOR

Michelle Woolley

WRITER EDITOR PROOFREADER TRANSLATOR

Bachelor of Library and Information Science: B.Bibl.
Reference & Research Librarian
Bachelor of Arts **Honours** in **Translation Studies and Editing**

Associate Member of Professional EDITORS' Guild (PEG)

CERTIFICATE OF EDITING

This letter certifies that I have edited the Dissertation detailed below.

Title:

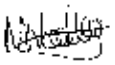
A COMPARATIVE STUDY OF PRINCIPALS' ROLES IN THE IMPLEMENTATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES

Author:

SHIREEN HELEEN BASJAN

STUDENT NUMBER: 2001097449

Regards



Michelle Woolley

Date: 31/07/2024

michellewoolley12@gmail.com
083 298 2077

Professional EDITORS' Guild

NANETTE J LöTTER

PROFESSIONAL EDITING AND TRANSLATING

TO WHOM IT MAY CONCERN

This is to certify that Chapters 1 through 6 of the accompanying PhD thesis titled: *A comparative study of principals' roles in the implementation of information and communication technologies* by Ms Shireen Basjan, have been electronically edited.

All language and technical errors have been corrected, and editorial comments and recommendations were made. It remains however the responsibility of the author ensure that the changes and amendments are accepted.

29 July 2024

Nanette J Lötter
BA HED MA (Linguistics and Translation) APEd, APTrans
Accredited Professional Editor and Translator (South African Translators' Institute)
Cell No: 082 2024 244
Email: nanette.lotter@gmail.com

APPENDIX K: TURNITIN REPORT

A COMPARATIVE STUDY OF PRINCIPALS' ROLES IN THE IMPLEMENTATION OF INFORMATION AND COMMUNICATION TECHNOLOGIES.docx

ORIGINALITY REPORT

9%	5%	6%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	scholar.ufs.ac.za Internet Source	1%
2	Albugami, Sultan. "Developing a Strategic Approach to Ict Implementation in Saudi Secondary Schools", University of Salford (United Kingdom), 2021 Publication	<1%
3	Abdul-Razak, Nasreen. "Teachers' Experiences of ICT Use in Grade 5 Mathematics Classrooms", University of Pretoria (South Africa), 2023 Publication	<1%
4	repository.up.ac.za Internet Source	<1%
5	uir.unisa.ac.za Internet Source	<1%
6	Submitted to University of South Africa (UNISA) Student Paper	<1%