Cape Peninsula
University of Technology

PERCEPTIONS OF EDUCATOR'S DIGITAL COMPETENCIES FOR TECHNOLOGY INTEGRATION INTO GRADE 7 CURRICULUM DELIVERY.

by

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Thesis submitted in fulfilment/~~partial fulfilment~~ of the requirements for the degree

Master of education

in the Faculty of Education

at the Cape Peninsula University of Technology

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Date submitted : December 2025

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ABSTRACT

This study examines the grade 7 teachers' perceptions regarding implementing digital technology in primary schools in South Africa when delivering the curriculum. Even though national and provincial education policies advocate increasing the pedagogical use of digital technologies, evidence points out that meaningful classroom integration varies. The qualitative research methodology that followed was based on an interpretivist paradigm and guided through Technological Pedagogical Content Knowledge (TPACK). The data set consists of semi-structured interviews and reflective journals as well as non-participant observations from purposively selected Grade 7 educators teaching in public primary schools located within Western Cape Province. Due to the lack of availability of participants during research period the researcher was only able to include six participants in the study. Analysis has been thematically done based on themes reflecting patterns in educators' perceptions about digital competence, professional development experiences, and contextual constraints. Educators have basic technological proficiency and understanding of the value that digital devices bring to teaching and learning but complain that they find it difficult pedagogically to integrate these tools towards enhanced learner engagement as well as curriculum delivery. Professional development was fragmented by imperative institutional and contextual challenges that continued to pervade the environment, thus calling for sustained, curriculum-aligned professional development and even more robust support at a school level for meaningful integration of technology at Grade 7 level.

Key words: Grade 7, curriculum delivery, digital technology, Integration of digital technology, pedagogy, TPACK.

DEDICATION

This thesis is dedicated to my late mother and father, Elizabeth Katrina Cloete and Jesajas Cloete as well as my late sister in law Marie Neethling who always inspired me to succeed in life, no matter the obstacles.

ACKNOWLEDGEMENTS

I wish to thank:

- **Almighty God**, for Your unceasing Grace and the gift of life and health.
- My wife, **Bernadette Ronel Cloete** and my sons **Chadwin John Cloete** as well as **Wesley Jesaja Cloete** for their support and encouragement.
- My supervisors, **Professors Agnes Chigona and Candice Livingston.** I appreciate your support in getting me through difficult circumstances, your patience, your advice, and the wealth of knowledge you have shared with me. I appreciate your kind advice, for keeping me focused when I strayed, and for all of your motivational speeches.
- **The educators** who bravely decided to take part in this study. There wouldn't have been any study without you.

LIST OF ACRONYMS AND MEANING

ACRONYMS	MEANINGS
CBT	computer based training
CK	content knowledge
DBE	Department of basic education
DoE	Department of education
ICT	information and communication technology
IWB	interactive white boards
LAN	local area networks
LMS	learning management system
MALL	digital-assisted language learning
PC	personal computer
PD	Professional Development
PCK	pedagogical content knowledge
PK	pedagogical knowledge
SAMR	substitution, augmentation, modification, redefinition
SDG 4	Sustainable Development Goal 4
STEM	science, technology, engineering, mathematics
TPACK	Technological Pedagogical Content Knowledge
TK	Technological Knowledge

WAN	Wide Area Network
WCED	Western Cape Education Department
WCG	Western Cape Government

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CHAPTER 1

INTRODUCTION TO THE RESEARCH STUDY

1.1 Introduction

Digital devices as a component of the teaching and learning experience form part of an overall emphasis on education systems globally directed by governments towards preparing learners for increasingly digital societies. There is a general perception that digital technologies are tools within the delivery of curricula to better involve students thereby developing critical and analytical skills related to problem-solving. This is reflective of changing national and provincial education policies in South Africa which are moving towards promoting the use of digital devices as integral parts of teaching and learning rather than ancillary aids supporting traditional methods. Digital competency, otherwise digital literacy or digital skills is the confident, critical, and responsible usage of digital technologies for learning, working, and socializing. Five major elements make up this competency: problem-solving, creation of digital content, communication and collaboration, information and data literacy, and safety.

The Digital Competence Framework for Citizens, (2022), an updated reference, widely recognized, precisely defines these five areas by listing particular competencies falling under each. It incorporates such vital abilities as assessing the credibility of data and information, digital identity management, or ecological impacts of digital tech on the environment. That framework steers educational policies and digital skill-building initiatives on course to help people and organizations measure their digital capability levels improve it in tune with new technologies and society's fast milling needs.

Sung et al. (2016:257) points out that digital technology have made it possible for learners to experience enhanced learning opportunities. These include personalisation and adaptability, context-awareness and ubiquity, interactivity between learners, communication among them as well as the connection between the formal and informal learning contexts.

Usage of phones and tablets is common and quite cheap, so this method has become liked by instructors who want to share syllabus needs through these devices. As the COVID-19 wave rose up in early 2020 this also became a growing health danger in South Africa. National disaster state was declared by President Cyril Ramaphosa on March 15, 2020. By March 23 cases were noted to be 927; hence a full lockdown was decided by the government from March 26 to contain the virus. Among other provisions under this law was a ban on public gatherings and closure of schools. The lockdown was initially set for only three weeks; thus, it was extended several times that without opening schools for most learners until early June 2020. It reopened partially on June 8

with some Grade 7 and Grade 12 learners returning to school; the rest returned over subsequent months. In response to the closures, schools largely from urban centers and wealthy areas initiated the use of digital technologies for remote learning. Applications aiding lessons include Google Classroom, Zoom, and WhatsApp; some institutions provided pre-recorded lectures while others simply sent handouts. This shift underscored how important digital tools are for keeping education going during the time of a pandemic. But the pandemic laid bare huge inequities in educational access. Schools in rural and poor areas didn't have the infrastructure for example, reliable internet, digital devices, and trained staff, many students, especially those in underserved areas, could not take advantage of remote learning and it widened the existing educational gap. The shift to digital education revealed the gaps in teachers' digital literacy and preparedness. Most of them were not ready for digital pedagogy and its challenges, both technical and pedagogical. Much evidence reveals that teachers are not ready and confident to use digital platforms, and since there is limited institutional support, this has been the penetration gap for technology in teaching practices. It put a spotlight on their know-how or the lack of it regarding the applications of digital technologies. The pandemic has brought to the surface the absolute need for systemic changes in education, particularly through digital integration. Investments in infrastructure, that is, devices and internet access at the peripheries, and programs for extensive teacher training are what will bridge the digital divide. Such efforts will also be critical in achieving SDG 4 by the United Nations, to ensure inclusive and equitable quality education for all.

Gaskell (2018:2) underscored the importance of the growing incursion of digital technology in educational endeavours, more particularly those learners and students who are otherwise physically constrained to avail themselves in an academic setting because of infrastructural impediments. Huge opportunities for teaching and learning can be concocted with e-learning, laptops, and tablets as well.

Minshew and Anderson (2015) indicated that integrating technology in the classroom on a daily basis helps teachers and their students become better practitioners and strengthens learners' knowledge base. Modern educators must get acquainted with technological tools to satisfy the needs of the lower socio-economic class. This study will discuss the perceptions of educators' competencies on the integration of digital technology into curriculum delivery to Grade 7 learners. It appraises how they use technological, pedagogical, and content knowledge (TPACK) frameworks for acquiring best teaching practices regarding barriers towards the effective integration of technology. The research specifically aims to: describe teaching skills with the use of digital tools for instruction in terms of their technological know-how, teaching methods,

and subject matter expertise; and determine perceived advantages of using digital tools in lesson plans that create better student interest, easy access, and new ways of teaching. Show the blocks teachers hit when adding digital tools, like not enough supplies, no help with tech issues, and lacking proper training. Develop actionable recommendations for improving professional development, infrastructure, and resource allocation to facilitate successful technology integration. This in turn makes the study provide insight to support the Western Cape Education Department (WCED) and other stakeholders in designing strategies for digital competency enhancement; a broader goal of advancing education equity and efficiency.

1.2 Rationale of the study

The use of digital technology in education has been strongly advocated at South African schools as part of preparing learners to function effectively within a digital society. The effective integration process is highly dependent on educators' competence, confidence, and support. Though policy frameworks stress the application of digital technologies in teaching and learning, there has hardly been any empirical evidence regarding Grade 7 educators' perceptions of their digital competencies. This study is therefore pertinent since it will bring out the educator's real-life experiences that will also bring out the gaps in training and support that need to be addressed if appropriate strategies are developed for strengthening digital integration at this particular level. The Western Cape Government (WCG) concluded that e-learning was a game-changer that could transform classroom instruction and revolutionise teaching and learning at schools in the Western Cape. They further postulate that their goal is to improve teaching and learning for all Western Cape students, primarily in the subjects of mathematics and languages, through the use of technology (WCG, 2017).

Given how commonplace technology is in the twenty-first century, educators should prepare to use digital technology in their teaching. Rana (2012:199) state that teachers who are tech-savvy can be effective "change agents in schools" by utilizing ICT to deliver the curriculum. Rana believed that a "change agent in schools" could be effective if the teachers were sufficiently trained in using ICT tools and then made use of them to change how curricula are delivered. It has been underscored that for the integration of technology into education, there is an imperative need for teachers to have specific knowledge referred to as Technological, Pedagogical, and Content Knowledge (TPACK). This would allow them to use digital technology adequately in teaching that particular subject and at the same time try to relate it to the themes of the curriculum in Grade 7. Therefore, teachers are prioritized since they do not only facilitate instructional practices but also instigate institutional change by inspiring others to embrace a digital learning framework among educators and learners. The force of

teacher agency is that it can only be effective if it is meaningful. Therefore, there shall be a parallel building up of beliefs, values, and technical expertise. Thus, where teachers have developed such skills, they are able to overcome structural and cultural impediments within the environment of education institutions to ensure the realization of progressive curriculum reform and enhancement of student learning experiences. The COVID-19 pandemic clearly portrayed the potential and unequal digital integration in the education systems of South Africa. Classes in many well-resourced schools continued to operate remotely during the lockdown using Google Classroom, Zoom, and even WhatsApp. However great the infrastructure support was these schools still lagged because of internet support and teacher training on how to integrate such new methodologies. This therefore brought a digital competencies gap among educators that now has to be filled by broad strategies toward digital integration.

Educator competencies have a direct bearing on the learner outcomes in Grade 7. Grade 7 teachers should have a good understanding of the content knowledge (CK) when delivering the curriculum. This understanding will enable teachers to select appropriate technology to enhance conceptual understanding of the learners. Pedagogical knowledge (PK) or how teachers teach will manage diverse learning abilities and teachers will adapt lessons to support varied learning needs by selecting and using digital tools to support learning processes. Teachers should use technical knowledge (TK) to understand the functions and limitations of these tools. Pedagogical content knowledge (PCK) will guide teachers to determine the appropriate methods for explaining key concepts eg. Using evidence-based inquiry in Social science.

1.3 Main research question

The main research question in this study was:

What are the Grade 7 educator's perceptions of their digital competence for integrating digital technology into their pedagogical practice?

This study revolved around the major question: What are the perceptions of Grade 7 educators regarding their digital competence for integrating digital technology into pedagogical practice?

In addition to the superordinate question of research, various sub-questions have been designed to elicit answers that support it.

- What did teachers perceive as the competencies necessary to integrate digital technology when delivering the curriculum in Grade 7?
- What did teachers perceive as technology integration barriers when delivering the curriculum in Grade 7?

- What did teachers perceived as technology integration barriers when delivering the curriculum in Grade 7.

1.4 Aim and objectives of the study

This study wishes to share the perceptions of Grade 7 educators regarding their digital competence for integrating digital technology into their pedagogical practice.

It has set out the following objectives;

1. To assess the perceptions of educators regarding their competencies to integrate digital technologies into their pedagogy when teaching in Grade 7.
2. To identify particular digital competencies which teachers think are necessary for effective technological integration in the delivery of curricula to Grade 7.
3. To explore barriers, as perceived by teachers, that hinder the integration of digital technology in the teaching and learning of Grade 7.

1.5 Review of literature

The following section is a review of literature for the purpose of a Master's degree in education entitled: "*The Perception of educator's digital competencies for technology integration into grade 7 curriculum delivery*". Local and international research, from a range of fields and disciplines has been reviewed for the purpose of this literature review. The review of literature will cover perception of digital competence and the limitations of educators to implement technology into the grade 7 pedagogy when delivering the curriculum.

1.5.1 How educators View Digital Skills

The National Information and Communication Technology (ICT) in Education Policy (DBE, 2018) emphasized the great role that digital skills play toward the achievement of goals as expressed within the Curriculum and Assessment Policy Statement (CAPS). The policy highlights a requirement for well-organized professional development for educators to basic levels of technological, pedagogical, and discipline knowledge. In its eLearning Strategy, covering 2020-2025, the Western Cape Education Department positions technology not as an add-on but rather as an impetus for curricular innovation integration to improve educational outcomes in language and mathematics through the use of digital tools. Such a strategic framework has opened up initiatives like Smart Classrooms, Google Workspace for Education platforms, among many other professional development programs for educators. Empirical studies by Jantjies (2020), Ngcobo and Govender (2021), and Padayachee (2020)

consistently reveal the gap between what has been described in most policies as practice and reality on the ground in education.

The concept of digital competence goes beyond basic ICT literacy. It includes the ability of educators to choose, adapt, and use digital tools effectively in their teaching practices to improve educational results. Recent academic works in South Africa (Masha & Mutambara, 2022; Mntambo, 2023) TPACK has been used to assess teachers' preparedness for integrating technology into their lessons. The results confirm that though educators usually have good content and related pedagogical techniques, they do not easily merge these with technological applications in an appropriate way to support the development of higher-order thinking learning. Thus there exists a "TPACK gap" which articulates structural and pedagogic barriers: inadequate professional development activities, lack of experience about practical digital tools, and absence of continuous mentoring within the institutions. The DigCompEdu framework, launched by the European Commission (Redecker, 2017), has also found its way into adaptation in South Africa at the hands of scholarly intellects such as (Gumbo., 2021 and Ramnarain & Hlatswayo., 2022) for appraising educators' digital competence. This study shares with others in reflecting that educators' digital competence is generally more robust in self-rating than it can be proven by actual demonstration. Most of the educators mistook using familiarity with operation as being fully competent; innovative use of technology in attaining a student-centered method of pedagogy. Therefore, this mismatch highlights an urgent need for targeted professional learning programs that would clearly link digital competence to curriculum delivery and assessment practices-in such key transition stages as Grade 7.

Many empirical studies have assessed the digital readiness of educators across the different provinces of South Africa, but none has focused on Grade 7. Padayachee (2020) conducted a national review on Information and Communication Technology (ICT) integration into teaching practice and revealed that teachers were ready to use digital tools for administrative work rather than for actual lesson delivery which should be interactive. Quintile 4 and 5 institution educators indicated a much higher level of digital readiness compared to those in quintile 1-3 institutions. This was discovered as an existing imbalance reflecting the historical imbalances prevalent in access. Mamba and Putsoane (2021) explores the confidence of teachers regarding digital literacy in primary schools within Gauteng and Western Cape provinces. Though educators rated the importance of digital tools very high, their confidence dropped when they had to design lessons in which technology would be integrated to achieve specific educational outcomes. This discussion is taken further by Ngcobo and Govender (2021) who analyse teachers' digital competence in rural areas of KwaZulu-Natal. From their

perspective, inadequate technical support and lack of professional development for staff were barriers to integrating ICT into education. In terms of language teaching, Mhlongo (2022) focuses on the strategies used by English and Afrikaans teachers at Intermediate Phase level with the use of digital devices in teaching reading comprehension. The results showed that even though educators made use of PowerPoint presentations, YouTube resources, and online comprehension games, there was no integrated use of these tools in a single lesson. They were just add-on tools. Naidoo and Sewry (2023) found similar results in their study of Western Cape primary schools. Systemic issues like time limits, a lack of institutional incentives, and support for collaborating with colleagues nevertheless affect even highly driven educators.

Such studies explain how much the context and institution factor into school leadership supporting staff training on ICT infrastructure and continuous professional development for the integration of digital resources by teachers. Few inquiries focus on Grade 7 educators. Grade seven represents a crucial point because that is when students begin to move away from teacher-directed learning and embrace autonomous, abstract, digitally mediated inquiry. This necessitates an understanding of the digital competence of educators at this critical stage to improve the continuity between the Intermediate and Senior phases.

1.5.2 Barriers

Over the wide stretch of South Africa's learning scene, the joining of digital tools by teachers is caught by a mix of four linked barriers: infrastructural lacks, teaching training gaps, institutional support holes, and current views. Infrastructure, technology, and connectivity: Several schools in the quintile three and four categories pointed out that there was no proper equipment set up for technology, internet connectivity, and technical support. Findings by Gustafsson (2021) and WCED (2020) also prove that even with increased infrastructural investments, allocations are still very unequal-with rural and semi-urban schools always at a disadvantage-infrastructure catches up with software development. Without reliable connectivity, educators cannot make use of online resources, cannot implement e-assessments, or involve learners through hybrid teaching.

Academic teaching progress: The effectiveness of professional development programs depends on their duration, context and follow-up support. Jantjies (2020) stated that limited workshops will not have a permanent effect on educator digital proficiency. What is required are continuous mentoring and collaborative support for teachers to be able to effectively integrate digital pedagogy into their daily teaching practices. The

TDCs in Western Cape have started offering modular eLearning training but the uptake by Grade 7 teachers is low because of competing professional responsibilities.

Institutional Endorsement: Studies by Masha and Mutambara (2022) and Ramnarain and Hlatswayo (2022) underscore the importance of school leadership and the spirit of collegiality in facilitating the adoption of technological paradigms. In one where principals support digital innovation, teachers are willing to try new tools. If the use of Information and Communication Technology (ICT) is regarded as an add-on, then uptake is superficial and perfunctory.

Perception and Attitudinal Constructs: The technology which educators perceive has a great influence on the way it is integrated into their teaching methods. A large number of teachers see digital tools as something to be used and not as an integral part of the curriculum delivery (Padayachee, 2020). Others express in varied forms nervousness about becoming redundant or explicitly in fear that their students will discover that they are less competent than them (Gumbo, 2021). Such perceptions create significant barriers and provide an easy excuse not to innovate or take risks, particularly in the area of language and literacy intervention where there already exists systemic performance pressure.

In 2019 Debbie Schäfer in her WCED strategic plan 2020-2025 executive authority statement alluded to the fact that “it almost goes without saying that digital skills are a sine qua non in the 21st century.” The advantages of digital technology were not fully taken advantage of and the following statistics show that the implementation and the lack of support to educators do not reflect the effective use of digital technology in our schools. Subject specific software would increase systemic results and outcomes in other subjects as learners would be able to access the curriculum online to improve their own results as well as work through the learning material at own pace. According to Jantjies (2020) the need for improved digital literacy training for both students and teachers, is still a priority noting the challenges faced by learners in under-resourced areas, especially concerning device access and high data costs.

The following table could be used as proof of the non-implementation of digital technology at our primary and high schools.

Table 1.1 Systemic Assessment results 2011-2019

The figure below illustrates the systemic assessment results for the period 2011 to 2019:

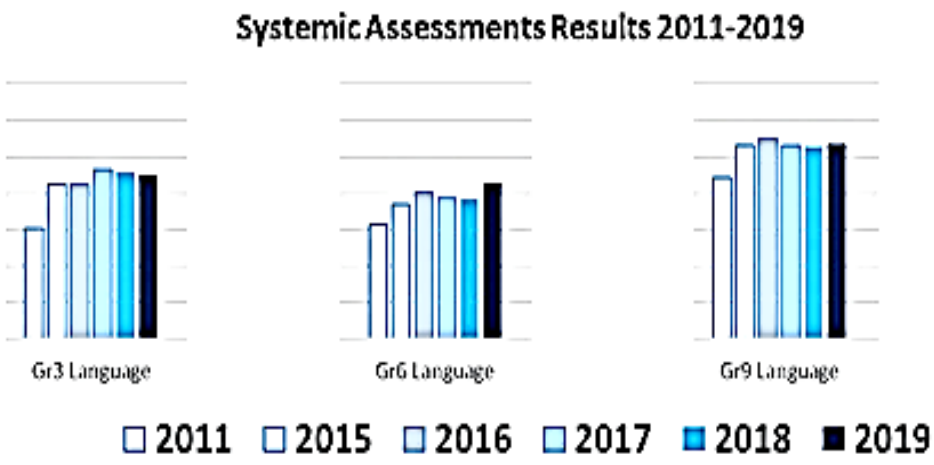


Figure 27: Grade 3, 6 and 9 Systemic Assessment results: 2011 to 2018

The table shows the marginal increase or decrease in the Language results obtained during systemic results over the period of six years. The WCED strategic plan 2020-2025 does not provide clear indications what percentages were obtained and what strategies would be utilised to improve the current results.

According to Padayachee (2017:37), educators provide efforts involving the integration of ICTs with significance and pertinence, as they are personally and professionally involved in them.

Perceptions according to Goldstein and Cassiamani (2022:9) are a behavioural response to stimuli that requires the person receiving the stimuli to act or be pro-active in making a change.

The Museum and Library Services Act, (2010:11) defines "digital competences" as "the abilities involved with using technology to enable users to access, assess, organize, produce, and convey information" in addition to "establishing digital citizenship" and responsible technology usage.

1.5.3 Theoretical framework

The theoretical framework of technological pedagogical content knowledge (TPACK) provides assistance for this qualitative research endeavor. Since it enables the infusion of digital technology into classroom practice, the TPACK framework was adopted (Mishra and Koehler, 2006). Thus, an assessment of educators' competencies in applying digital technologies for curriculum delivery to Grade 7 learners is very important and so is the analysis of this data for making informed recommendations.

In their research, Thompson et al. (2009:125) proposed Technological Pedagogical Content Knowledge (TPACK) as a seven-factor constructs to explain how communication technology is integrated within teaching. The TPACK framework serves as the theoretical foundation for this research investigation. According to Koehler and Mishra (2006:1024), the creation of a “complex, situated form of knowledge” is required for the educational use of technology. Mishra and Koehler, (2008), postulated that TPACK is "a way of thinking about the knowledge teachers need" in order to understand how to successfully integrate technology into teaching and learning. Technological knowledge (TK), which is a representation of teachers' technology integration, is added to Shulman's construct of pedagogical content knowledge (PCK) to create the TPACK (Koehler and Mishra, 2006:1017). The framework will be discussed in-depth in the chapter 2.

1.6. Design and Methodology

The study design provides a careful outline of how this study was framed to assess the perception of digital competencies by Grade 7 educators and their experiences with the integration of digital devices in delivering curricula. It describes philosophical assumptions, methodological orientation, participant selection procedures, data collection methods, and analysis processes-all duly observed during the conduct of this research. A qualitative approach that is also interpretivist has been used to elicit the subjective meanings which can be rich when attributed by educators based on their experiences in such contexts. The research and determination of each participant’s perceptions with regards to the integration of digital technology into the Grade 7 curriculum delivery were made possible by the use of an interpretative paradigm. The research also made it possible for the researcher to investigate how the participants used digital technology when delivering the curriculum in Grade 7. Several data sources were used in a case study design for this qualitative investigation (McMillan & Schumacher, 2014).

1.6.1 Research Paradigm

This study thus fell within the interpretivist paradigm, which concerned itself with understanding human experience from the perspective of its participants. The interpretivist worldview emanates from the belief that reality is socially constructed and context-dependent (Creswell & Poth, 2018). It permitted an analysis of how Grade 7 educators construct meaning about their perceived digital competencies and related challenges regarding the integration of digital devices as influenced by such contextual factors as training, infrastructure, and support, among others., Rather than generalizing findings to a wider population, this study sought to 'read' or interpret narratives for depth and insight.

1.6.2 Methodology

The methodology to be employed for this inquiry is elucidated within this section. The criteria for venue selection, participant delineation, data acquisition techniques, and analytical frameworks are succinctly addressed. Furthermore, a discourse on the study's veracity, the researcher's epistemological position, and the ethical imperatives will also be encapsulated in this chapter.

A qualitative research approach was used to gain a full view of the thoughts and experiences of educators. Qualitative methods work well for studying complex social issues where human action and meaning are key (Merriam & Tisdell, 2016). This method made it possible to look at feelings, skills, and teaching ways inside normal learning settings. The study was further organized as a multiple-case study thereby allowing a comparison between schools but maintaining an individual perspective. At the level of each participating school, insights were contextually based that cumulatively built up to wider trends across the Grade 7 teaching landscape.

1.6.2.1 Site selection

Two schools from the Western Cape were chosen because they leveraged digital technology to ensure seamless Curriculum delivery at Grade 7. South African schools are rated by quintiles based on the socio-economic levels of their communities and this system was integrated into post-apartheid educational reforms as a means through which resource allocations would address historical imbalances. This is in that category considered least disadvantaged. Normally found in better communities, having higher infrastructure and resource accessibility than the lower quintiles, government funding per learner here is the lowest because it is assumed that extra resources through fees and private contributions can be garnered. Most often located within urban or suburban areas. They keep up good infrastructure; access to technology enabled learning materials are enough; however, they do enjoy slightly better conditions in terms of learner to teacher ratios whereby more individualized attention can be given to learners. The researcher is not affiliated with these schools.

1.6.2.2 Participant selection

A purposive sampling technique was applied in selecting those participants who could share relevant information based on the objectives of the study. A convenience sample consists of elements that we know or can get fast and easy access to (Du Plooy, 2014:142). Cases, incidents, circumstances, or informants that are near at hand fall within the scope of availability for the researcher to conduct the study through this sample procedure (Battaglia, 2011).These were Grade 7 educators who have used digital devices within the classroom setting for at least one year. Therefore, 6 educators

from two public schools were chosen depending on subject specialization, experience, and level of expertise in technology use to ensure a fair cross-section. Involvement was free and educators were reached through their school heads after getting institutional consents from important education authorities. Choice was managed by the participants' eagerness to think deeply about their professional practices and to speak clearly about their experiences with digital technology integration.

Three educators in the senior phase (Grade 7) were selected at two schools as both schools only had two Grade 7 classes. The participants selected were class teachers and the other participant was a Physical Education teacher and a Music teacher. The grade 7 learners are able to navigate themselves through technology to achieve desired outcomes hence Grade 7 participants. A Total of six participants were selected for the research purpose. Three grade 7 teachers at each site were selected

1.6.2.3 Data collection

Triangulation was achieved by using three qualitative data collection instruments. The credibility of the findings was enhanced by using semi-structured interviews, reflective journals, and classroom observations. A different dimension of the experience and competence of educators was captured by each method.

1.6.2.3.1 Interviews

The researcher will utilize standardized open-ended interviews to compile data. This form of interview is designed to solicit the same set of inquiries from each participant, thus making it easier for the investigator to analyse. Additionally, it provides a more streamlined comparison between participants' perspectives and insights (du Plooy-Cilliers et al., 2021:188).

The major data was obtained through in-depth semi-structured interviews, whereby the participants had an opportunity to freely express their opinions and the researcher could further probe on emerging themes. Each session took about 45–60 minutes of time and was done via face-to-face. The interview guide was framed based on a TPACK (Technological Pedagogical and Content Knowledge) framework that included such components as educators' comfort levels with digital devices, pedagogical adaptation, and contextual challenges.

1.6.2.3.2 Reflective journals

The participants kept reflective journals for four weeks. In these journals, they noted down their day-to-day experiences with digital devices during instruction. Such narratives give a real, long insight into teaching practices and share changing thoughts about digital competence. The journals thus become very useful in catching those faint

emotional and cognitive responses which otherwise would never be articulated in formal interviews. Reflective writing therefore encouraged critical self-assessment in which participants discovered some of their implicit biases and spoke more sophisticated views, thereby enhancing the quality of data and providing a complete description of the context of the study (Boud et al., 1985).

1.6.2.3.3 Observations

Non-participant classroom observations were essentially designed to validate and triangulate the self-reported data. Observations bore in mind how educator's infused digital tools into lesson delivery, class control, and management of learners' attention and participation. Observable actions, interaction patterns, and contextual elements that were found to be influencing technology use were captured through field notes. Patterns of behaviour e.g., constant usage of a certain tool or reluctance to embrace a new methodology give more explicit details about the attitudes of the participants. The environmental context also shapes perceptions since it unveils external factors that may be influencing behaviour such as available resources or institutional support. Moreover, observation enables the researcher to pick implicit attitudes which may not be verbally expressed thus offering a more holistic understanding of perceptions. When applied together with interviews or reflective journaling, this method assists in triangulating data hence making it more valid and deep (Creswell, 2014; Merriam & Tisdell, 2016).

1.6.2.4 Data Analysis

Data were processed through thematic analysis following the steps provided by Braun and Clarke (2021). The steps included: getting familiar with the data by reading it many times, creating initial codes, searching for themes, reviewing and improving themes, defining and naming themes, and finally writing the narrative report. The analysis was inductive, allowing the pattern to arise from the data and at the same time informed by the theoretical lens of TPACK. AtlasTi, in organizing textual data, helped keep transparency and traceability while providing codes. Cross-case analysis was carried out later. Convergent and divergent themes between schools were brought out. Contextual influences on educators' perceptions and competencies came to light. Zhang and Wildemuth (2009:309-311) suggest eight steps of qualitative content analysis as a method. The process begins with preparing the raw data into written text, followed by determining which coding unit to analyse (e.g., individual words, phrases, sentences or paragraphs). Next is creating categories and assigning them labels relating to the research topic. This is then tested on a sample text for clarity and consistency of category definitions. The researcher conduct selective coding to determine core codes for further interpretation based on all relevant factors, in order to

prevent misinterpretations. Once this has been conducted, the analyst assesses his own coding consistency before drawing conclusions from coded data gathered so far. Lastly, methods should be reported as completely and truthfully as possible when it comes time to publish results.

1.6.2.4.1 Coding Process

The researcher made use of qualitative content analysis software to support his analysis.

The participant interviews were taped and then transcribed. To make sure the transcribing process was precise and error-free; the researcher read the transcripts several times over. The researcher was also able to gain a deeper insight of each participant's experience by going back and reviewing the transcriptions. Data analysis needs to be done with consideration for the study's objectives and research challenge (Walliman, 2011). According to Walliman (2011), the type of analytical method that needs to be used will depend on the nature of the research problem. There was a qualitative analysis more precisely, coding used. According to Walliman (2011), coding is the process of creating taxonomies and typologies from large amounts of data (transcripts or notes) by spotting discrepancies in the data, which creates subgroups within the main category.

1.7 Trustworthiness

To ensure rigor and credibility, several validation strategies were employed: Triangulation. Data from interviews, journals, and observations were matched to make sure findings are correct.

Member checking. The very participants whose lives were interpreted checked preliminary interpretations for accuracy and authenticity.

Audit trail. Detailed documentation of procedure steps and analytic decisions has been recorded.

Reflexivity. Researcher scribbles notes to self about emerging biases regarding heroism in teaching and tries not to privilege such notions, while embracing an essentially optimistic view.

The researcher employed member checking in an effort to determine reliability. Member checking is the process by which the researcher returns the themes or the completed report to the participants to find out if they believe the results are correct (Creswell, 2014). In order to ensure that the transcribed words are authentic and that the researcher did not alter or add any information, member checking was employed. Triangulation of data was also done. This is how the researcher developed themes by

combining data from other data sources, such as observations and interviews, thereby giving the study more validity (Creswell, 2014).

1.8 The researcher's position

The researcher as outsider: There was no relation between the researcher and the schools where the data was collected and this resulted in an absence of bias towards any theme or active search for evidence to bolster these themes. The researcher took extra care to avoid guiding individuals in any one direction. Everyone was free to speak, and every word was captured exactly. The researcher did not attempt to steer participants in any particular path. In this sense, the researcher evaluated the gathered data exactly as it was provided and was not swayed by any prejudice in doing so. Also, not naming the schools made people comfortable to talk openly, which helped in getting true data. At the end, participants got proper information saying their taking part in the study was totally by choice and that they could decide not to join or leave anytime.

Participant engagement in the reliability and validation exercises could also contribute to making sure that subjectivity and bias were balanced. All interview transcripts and any other personal communication between the researcher and participants were allowed for verification by the participants.

1.9 Ethics considerations

Ethics refers to the "moral or professional code of conduct that sets the standard for your attitudes and behaviour" (Du Plooy-Cilliers et al., 2021). Permission was secured from the concerned institutional research ethics committee and the provincial Department of Basic Education. The participants were made aware of the purpose of the study, its voluntary nature, and how they could withdraw at any stage. Informed consent was obtained before participation. Data has been shifted under pseudonyms in transcripts and reporting. Reflective journals and observation notes have been stored in a digital folder that is password protected. Privacy, dignity, and all other professional boundaries of the participants have been respected during the entire research process. It will be made clear to the participants, in written form, what the proposed study entails. The researcher will explain verbally what the study is about, its objectives as well as how research is going to be conducted. Return of signed informed consent forms gives approval for participation; however, return of this form does not remove the right to withdraw from the study at any time if she feels like. No part of the school or educator or any other party will ever be mentioned at any time or in any place. All documented data shall always remain safe together.

1.10 The thesis's structure

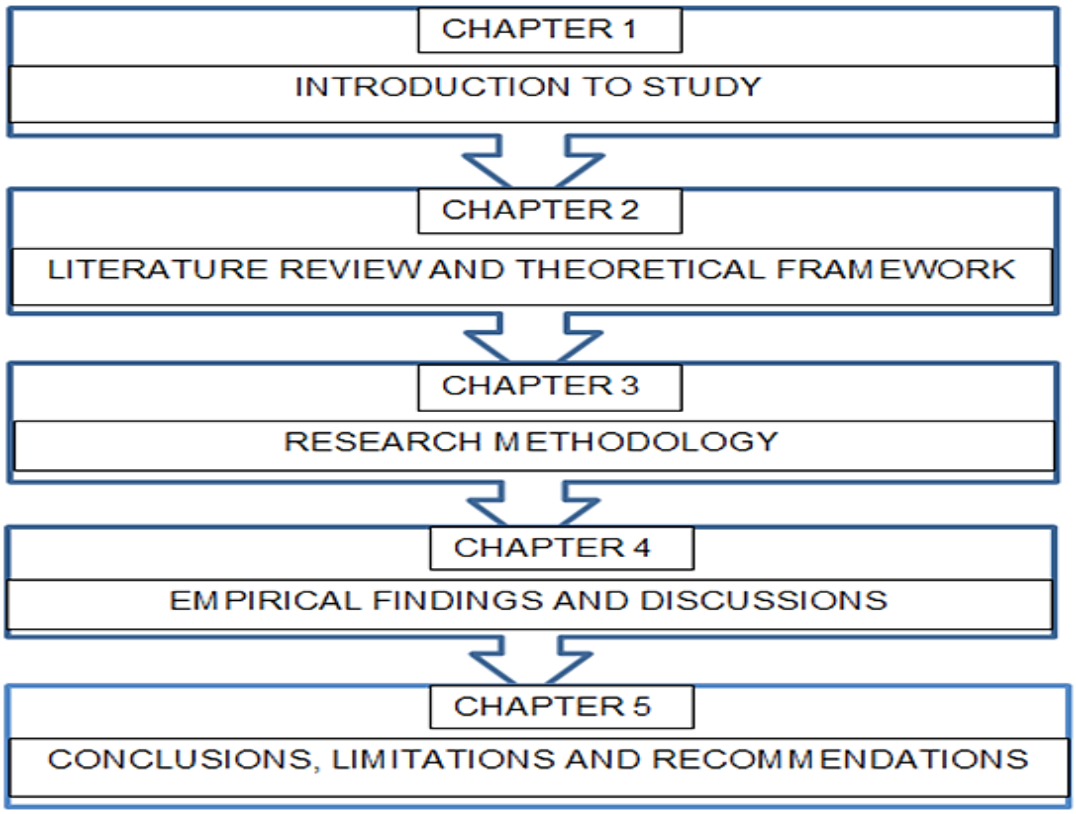


Figure 1.1: The thesis's structure

Chapter 1: In Chapter 1, the study's history is presented, the research topic is stated, and the study's goals, justification, and structure are explained

Chapter 2: Review of related literature on educator's digital competence, and technological integration. It also discussed relevant theories that anchored this study.

Chapter 3: Research Methodology – Discussing the research design and approach, data collection methods, and trustworthiness and ethics in the study.

Chapter 4: Data Presentation and Analysis – A very detailed presentation of data collected from participants with its analysis.

Chapter 5: Discussion of Findings – This discusses, relates, and synthesizes the results to the research questions and objectives, as well as literature.

1.11 Conclusion

Chapter 1 presents the introduction, background, problem statement, and justification of the research project. It describes the major research questions, supporting questions, and the purpose of research. Justification for using TPACK as a theoretical framework for this study is also provided together with an explanation of research methodology. Key concepts and terms are defined in detail. Figure 1.1 provides Chapters to be discussed in this thesis.

The study is intended to look at Grade 7 educators' perceptions of their digital competencies and how such competencies may influence the integration of digital technology into curriculum delivery. In addition, the study seeks to contribute toward building a knowledge base on the degree of professional digital readiness by educators in South African schools. It will explore the self-perceptions of digital competencies by Grade 7 educators, the role that professional development plays in enhancing digital skills for educators, challenges and barriers which educators face when trying to implement digital technology into teaching practices, and finally, how contextual factors play a role in the implementation of digital technology within Grade 7 classrooms. This study presupposes that educators at the institution under study would be willing to advance candid reflections regarding their digital competencies and experiences with technology integration. It also assumes that what the participants feel reflects their real level of confidence and practice in using digital technology, and lastly, when provided, professional development opportunities positively contribute to the development of educators' digital competencies. Factors such as infrastructure, resource availability, and institutional support in the context shape the outcome of digital technology integration efforts.

The underlying premise of this research is that the mere presence of educational technology does not ensure its efficient utilization. The study likely assumes that educators’ perceptions of their competencies are critical to successful digital technology integration. It is assumed that integrating digital tools, particularly digital technology, improves teaching efficacy and learning outcomes. There is an implicit assumption that digital technology is available and can be effectively utilized in the teaching environment, even in resource-constrained settings. It is assumed that proper training and exposure to technology will positively influence educators’ perceptions and their ability to integrate technology effectively.

The researcher thinks that the successful integration of digital technology is necessary for efficient content delivery in classrooms. Only until sufficient support is given to the educators for the integration of digital technology will this be fully attainable.

The premise of this study is that teachers in Grade 7 are not well-versed in the integration of digital technologies. As a result, there are issues in integrating technology for instruction in the classroom. Thus, it is imperative that WCED launch a campaign to provide educator’s the tools they need to integrate digital technology in their daily pedagogy especially when delivering the curriculum in Grade 7.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

Digital device usage has increasingly assumed the central position in current teaching and learning practices. As schools assist learners to adjust into the fast-changing digital world, educators' competencies in effectively employing technology within the curriculum are being scrutinized (Mishra & Koehler, 2006; Tondeur et al., 2017). The theoretical frameworks, previous research studies, and practical considerations about educators' digital competencies particularly in relation to Grade 7 curriculum delivery are discussed in this chapter. Challenges and opportunities as well as strategies for enhancement of technology integration in South African schools will also be described. This literature review opens with a brief discussion of the TPACK framework as a guiding theoretical model and moves on to an assessment of educators' perceived digital competencies. Next, technology integration practices in Grade 7 curriculum delivery is presented, followed by an analysis of challenges in digital integration. The chapter ends with a summary that draws out the main findings from the literature. The study's focus, as was indicated in the chapter before it, was on the educator perceptions of their digital competencies for Grade 7 curriculum delivery. Reviewing earlier research on the incorporation of digital technology is therefore essential. This is necessary to increase awareness of concerns pertaining to the difficulties teachers have when integrating digital technology. As a result, the main objective of this chapter is to review the literature that delves deeply into topics related to the pedagogical integration of digital technology when delivering the curriculum in Grade 7. This chapter engages the literature and critically analyses previous thoughts on the incorporation of digital devices in the delivery of curricula. It therefore sets the context of digital education globally, nationally, and within the Western Cape while reflecting on educators' self-perceptions of their digital competence. Opportunities are highlighted while challenges are also brought to light through analysis, positioning Technological Pedagogical Content Knowledge as the lens theoretically guiding this study that is based distinctly on contemporary debates yet directly aligned with the aim of research relating to Grade 7 educators' perceptions regarding digital competence.

The purpose of the literature research was to identify a reliable framework that would support this investigation. It is necessary to consider current classroom practices in order to integrate developing digital technology, or ICTs, in the classroom as effectively as possible. For digital technology integration to be implemented in classrooms effectively, the TPACK framework is essential. Because of the potential benefits that come with incorporating various forms of digital technology into the curriculum, schools

have started to do so as they continue to permeate our culture (Tunjera & Chigona, 2020). Understanding the obstacles teachers experience in integrating different instructional technology in the classroom is necessary for the best possible integration of technology such as computers, interactive white boards (IWB) as well as digital technology. This study will demonstrate that TPACK encompasses a range of instructional strategies explained later in the chapter.

This study aimed to understand how instructors used digital technology for teaching and learning and how it was influenced by professional development, technological support, and digital resources. Therefore, an exploration and critical analysis of prior local and global research projects on connected themes was required. According to Yin (2009:14) the goal of literature reviews is to formulate "sharper" and more perceptive queries about a research issue in addition to looking for answers on a topic that is already well-known.

2.2 Literature review

The current competencies of teachers to use digital technology for teaching learners from disadvantaged background are a cause for concern in our country. The Government of South Africa must take steps to ensure the educational success of all students, as this is linked with employability and a reduced risk of poverty. Poverty remains a great challenge in this country, and academic performance is unfortunately low. Strategies should be implemented to raise the level of success among learners. (Naidoo & van Schalkwyk, 2021:180). Smith and Jones (2020) is of the opinion that “effective pedagogical approaches tailored to diverse learning styles can enhance student achievement and engagement”. Smith and Jones (2020:45) and Johnson and Lee (2022) recently posited that “a supportive learning environment, coupled with constructive feedback, significantly contributes to student success”. The advantages of instructional technology during curriculum delivery far outweigh the conventional approach to teaching and learning. Brown and Taylor (2019:78) agrees with this statement as they concur that “integration of digital devices in education provides opportunities for personalized learning, fostering better outcomes among learners” Digital devices are now central to teaching and learning globally. Recent scholarship frames technology integration not as an additive practice but as part of the core pursuit of best pedagogy (Redecker, 2023). In the same wave of studies that revealed varying degrees of perceptions of competence by teachers, Nyathi and Joseph (2024) found South African educators to be valuing digital tools meanwhile perceiving professional development as generic and less related to specific subject contexts. This is in tandem with Moila’s (2024) study eliciting evidence from the domain of mathematics education that while teachers can perform basic technical functions, they have challenges with

pedagogical integration of devices. At the national level, the Department of Basic Education (DBE, 2021) acknowledges that digital integration forms part of the readiness for learners toward a knowledge-based economy. There has been uneven implementation, though. Schools in rural and disadvantaged communities still do not have infrastructure and connectivity. This literature thus advances that though policy rhetoric is upbeat, classroom realities are delivered within existing systemic constraints. Such tensions make it essential to investigate teachers' lived perceptions, which this study addresses through a Grade 7 focus.

It is the Government's aim through education to relieve poverty and inequality as well as create the scope for economic growth for learners from disadvantaged backgrounds. Using digital technology is essential in modern day teaching to provide disadvantaged learners with the chance of benefiting and being successful. Nwajiuba and Olasehinde (2016:76) argued that digital learning offers unique prospects for circumventing educational issues in South Africa, primarily those concerning disadvantaged learners. Better access to education can uplift the performance level and economic development. A digital learning implementation that will be effective must be based on an understanding of its merits and demerits accompanied by suitable strategies in response to challenges identified. The National Curriculum Statement Grades R-12 is designed to ensure that all learners, regardless of their social or economic background, ethnicity, gender, physical abilities and cognitive capabilities can acquire the necessary knowledge, skills and values for achieving personal fulfilment as well as meaningful participation in society as citizens of a democratic nation. (Education, 2021)

The South African Department of Basic Education (2014) created a framework of teacher competencies for digital learning to assist with the incorporation of digital technology into instruction and education. The framework emphasizes the skills, knowledge, and dispositions that educators need to wield digital tools for the enhancement of learning outcomes. Among these competences are digital literacy, pedagogical awareness in practice and communication, and collaboration plus ethical as well as responsible use of digital technology (Department of Basic Education, 2014).

As noted by Babu and Sridevi (2018:84), the use of e-learning has increased as educational institutions strive to bridge geographical and social divides in order to provide distance learning. This can lead to unifying academic objectives and perspectives.

Traxler and Koole (2014) contend that the educational use of digital computing technology and applications has much untapped learning potential, as well as an abundance of opportunities available to students and educators. Nonetheless, they

understand that it would be a challenge to incorporate such devices into classroom sessions due to their already embedded presence in daily life; therefore, it becomes necessary for teaching methods to be adjusted creatively with careful consideration given.

According to Chigona (2015) the integration of digital technology in educator pedagogy will transform their curriculum delivery. Mishra and Koehler (2017) agree with this stating that “integrating digital devices into pedagogy allows educators to create more engaging and interactive learning environments, ultimately improving student outcomes”. Demir (2018) posits digital technology as the use of teaching aids that aid educators when delivering the curriculum. Chigona (2017:23) is also of the opinion that educators need to come “to an understanding that digital technology has power to both advance innovation and collaboration or mislead and distort, and it is the classroom teacher/facilitator’s responsibility to foster the realization of the power of digital technology.”

A survey performed by (Deloitte, 2016), has indicated that many teachers noted a lack of adequate training in the use of instructional technology, as well as having insufficient time to incorporate these tools into lesson plans. Moreover, they noted challenges regarding integrating digital learning materials with current instructional content.

Ngadi (2024) considers that students from remote areas can successfully apply digital tools for data collection and online collaboration applications in their projects on regional phenomena. As asserted by Ngadi, such tools will enable students to collect and analyze data at their disposal and share results in real-time even when working under conditions of low-connectivity. In her further elaboration, digital data tools facilitate worldwide team collaborations by process digitization, bettering the quality of data, and giving access to shared projects through the adoption of' Cloud-based Platforms.

The purpose of this study is to shed light on how teachers view the use of digital technology to support the teaching of the Grade 7 curriculum.

The study also aims to highlight the importance of using technology pedagogical content knowledge for curriculum delivery.

2.2.1 Research of teachers perceptions using digital technology for teaching

The perceptions of teachers strongly influence the adoption and meaningful use of digital devices. The beliefs about the value of technology by educators often determine whether it gets integrated effectively or not (Ertmer & Ottenbreit-Leftwich, 2019). Some

South African studies indicated that teachers are still hesitant because they have not been well trained, they do not feel confident, and they had negative attitudes (Chigona, 2015). More recent evidence reveals that the greater bulk of educators see possibilities in digital device usage for learner engagement improvement. However, they are equally critical about support for them. (Nyathi & Joseph, 2024). Thus, perceptions are formed at the intersection between individual attitudes and systemic and contextual factors and need to be understood as such within curriculum-specific practices. Research has been conducted to understand both the technological abilities and information teachers require in order to effectively make use of digital technology within their teaching, as well as the attitudes, assumptions, and instructional approaches which either facilitate or impede such usage.

Research conducted by Kearney et al. (2012) investigated the ability of 99 Australian pre-service and in-service teachers to incorporate digital technologies into their instruction. Results determined five key competencies: pedagogical technology competence, pedagogical knowledge, technology expertise, content information and understanding associated with utilizing any type of digital device.

A survey conducted by Ertmer (2012) with 55 elementary and secondary school teachers revealed their beliefs and attitudes relating to digital devices in the classroom. Results of the study pointed out that, although teachers were aware of how digital technology can promote student learning, they were uncertain about its use due to apprehension over managing class activities and potential disruptions. Howard (2013) is of the opinion that “teacher attitudes and beliefs significantly influence the integration of digital devices in classrooms, with prior experience playing a key role in adaptation. A study by Tondeur et al, (2016) confirmed that “the successful implementation of digital devices in education depends on teachers’ confidence, pedagogical knowledge and institutional support.”

In the study conducted by Quinones (2018), the authors analysed how digital technology implementation could improve English language learning in a rural school situated in Mexico. The study yielded results which elucidated four abilities as crucial for educators to carry out successful teaching techniques involving digital devices: technology skill, digital pedagogy expertise, understanding of the material and cultural perception.

The research of Hamidi and Chavoshi (2019) looked at what influences the adoption of digital-assisted language learning (MALL) among Iranian English language teachers. Results show that knowledge about using technology makes up the main factor in their decision to accept MALL. The study underscores the role that for teachers to play in successfully using digital technology, competence to help the disadvantaged is

important. Competency of teachers does not only mean knowledge about technology but knowledgeable pedagogical approaches and cultural fluency when integrating this sort of technology into education practice. In addition, teachers must have an attitude and perception that real support for using digital devices inside the classrooms. Note, these studies were done outside of South Africa and may not have similar contextual value. However all of them underscore the basic imperative for teachers' competencies to be able to effectively use digital technology in support of learners coming from disadvantaged backgrounds.

2.3 The WCED e-Learning unit

The Western Cape Education Department (WCED) has invested heavily in e-learning as a means of driving the provincial strategy. For instance, through the Game Changer project it intended to enable access to digital devices, broadband connectivity, and e-learning content (WCED, 2019). It must be noted that though certain schools have better access because of these initiatives, beneficiaries were not equitably distributed. It is important to note that while certain schools have great access because of these initiatives, the beneficiaries were not distributed equally. As argued by Isaacs (2020) and corroborated by Chomunorwa et al. (2025), rural and under-resourced schools still face constraints in sustaining digital learning environments. This supports the notion that competence is more critical than mere access when considering effective integration; thus placing the teacher at the centre of the contextual support.

Strategies to integrate digital technology into curriculum delivery in schools were introduced to “plant a seed” of change in educator perceptions regarding the use of technology in curriculum delivery.

The Khanya project became subsumed under the newly established e-Learning section at WCED, created in 2007 for managing e-Learning within WCED. Among other aspects, by 2008 the unit had applied the following strategies. (Sadeck, 2016:8).

Launching an LMS (learning management system); Introducing freeware and open educational resources; setting priorities for and carrying out ICT-integrated teacher training; and introducing a face-to-face and online blended training methodology.

The Khanya Project's goal was expanded upon by the e-Learning unit, which in turn launched the e-goal for e-Education. 2012 saw the unveiling of the WCED's "e-Vision for e-Education: e-Learning and e-Teaching in schools of the future," a five to ten year plan. The successful integration of ICTs into teaching and learning activities through e-learning and e-teaching was supported by the e-Vision. Furthermore, it aimed to facilitate deep learning opportunities for students that would result in improved results

in learning and learners will be better equipped for the workplace of the twenty-first century according to (Schreuder, 2016)

ICT hardware in Western Cape schools at the time of the e-Vision comprised PCs, laptops, interactive whiteboards, data projectors, and servers (Western Cape Education Department 2012). The use of technology in education could be divided into two groups: According to the Western Cape Education Department (2012), an e-learning approach based on a computer-based teaching (CBT) methodology from the 1970s recommended using closed software in computer lab configurations primarily for drill and practice, and e-teaching practices using data projectors and interactive boards through conventional teaching methods.

Six work streams were identified as the focus of the WCED e-Vision: curriculum/education, systems, environment, e-administration, e-teaching, and e-learning (Western Cape Education Department, 2012:8). The WCED published its e-Learning Strategy in 2016, with the goal of bringing the 2012 e-Vision for e-Education to reality. In a statement by the (Western Cape Government, 2019) the “WCED has invested in broadband connectivity, interactive whiteboards and digital resources to support 21st –century learning”. A study by Isaacs (2020) and Westaway (2021) affirms the commitment by the WCED to “provide access to e-learning platforms” and “ensuring that students develop digital literacy skills essential for the modern economy.”

2.3.1 The WCED e-Learning Game Changer

In 2015, the WCG adopted the e-Learning Strategy of the WCED, which sought to improve e-Teaching and e-Learning (WCED, 2016), as a politically driven e-Learning Game Changer. Eight game-changers that could solve issues the province's residents confront were highlighted by the WCG (Zille, 2015:1). Eight priorities were identified as game changers:

1. Increased apprenticeships.
2. Energy security is achieved.
3. Provide high speed internet access.
4. Using high-quality e-learning in classrooms.
5. Availability of quality after-school programs.
6. Create a model for better living.
7. Reducing negative effects of alcohol.
8. Providing enough sanitation and water.

The fourth game changer was the e-Learning Game Changer, which had the following features: The establishment of better connections between schools via a fast Wide Area Network (WAN) and this would foster collaboration between schools. Installing Local Area Networks (LANs) in classrooms to facilitate internet use during lessons for research and Math Curriculum Online (MCO); replacing outdated labs with more efficient computers to keep up with current speeds and operating systems as well as setting up additional labs to accommodate the learner populations at schools. Building classrooms that are rich in technology (smart classrooms) and using e-learning and e-teaching in schools, as well as providing teachers with creating and growing easily accessible digital resources on the internet for teachers, parents, and students alike.

To support the e-Learning Game Changer goal statement, the six work streams that were defined for the project were taken from the e-Vision streams and further streamlined (Western Cape Government, 2019) as set out in Figure 2..

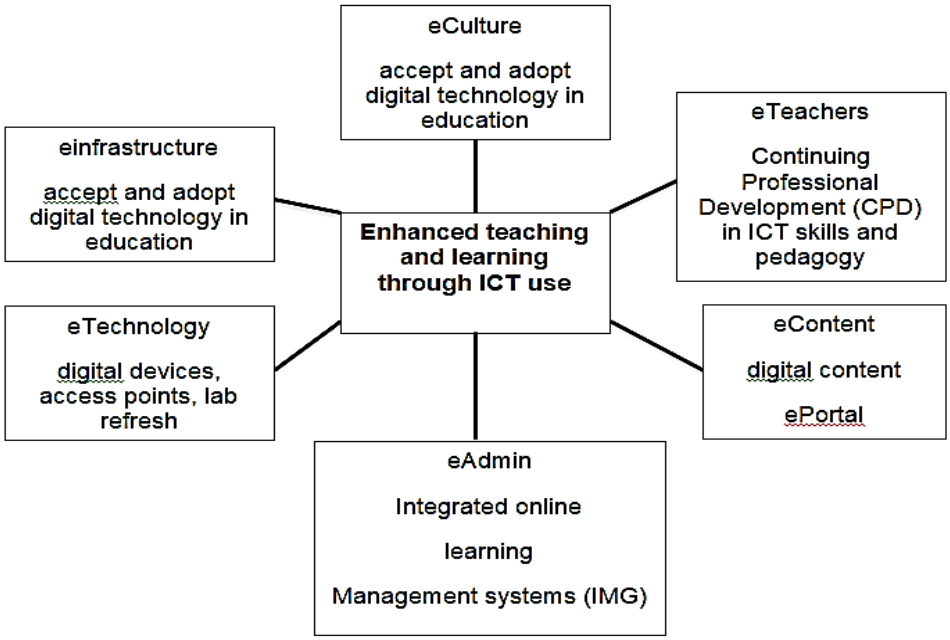


Figure 2.1: e-Learning Game Changer: Six work streams

This material is adapted from Western Cape Government (2019)

Technology innovation in the sphere of education brought an incredible transformation in the way teaching and learning used to happen. This revolution is based on 3 main blocks: e-Infrastructure, e- Technology and e-Culture. These tools represent the "bread and butter" of contemporary classrooms and are especially important at the Grade 7 level with students who are becoming more computer literate and the teachers are often feeling left behind. In this article we will consider how these aspects enable meaningful use of digital technologies in classrooms, as well as the shifts attempted by the Western Cape Education Department (WCED) pertaining to these aforementioned issued.

Everything starts with e-Infrastructure - the support that links places of learning to the virtual world. This includes the expansion of Wide Area Networks (WANs) which put schools on the internet; and Local Area Networks (LANs) that connect classrooms within a school building to household Wi-Fi networks. These setups provide access to online course offerings, cloud applications, and real-time collaboration. Without this setup, entry to digital resources would not be possible.

Then comes e-Technology - the hardware that actually delivers the lessons. That is, computers, iPads, projectors, and teaching software. In Grade 7 these become not just tools on the side but vital means for creating lively, interactive lessons. Videos, simulations, digital games can be used by teachers to make a deeper relation of content to learners and holders of interest. It is not just having the technology; rather, it is the e-Culture that ensures the success of digital transformation.

It is not about the tools but rather the mind-set. E-Culture is the change in beliefs, attitudes, and daily practices of educators concerning the use of technology. Building this culture requires effort. So, e-ICT helps teachers, heads, and admin workers with planned growth of professionalism meant to build confidence and abilities through ICT joining training. As teachers become more comfortable with using web-based tools they are prepared to use them wisely which raises the quality of teaching as well as learning results. Outside the classroom, the WCED has made admin jobs simpler through the e-Admin work stream. This plan brings online fixes for daily tasks like keeping records, noting attendance, and making reports.

For many teachers, this efficiency is an eye-opener—it shows how real and helpful digital tools can be in cutting down work and boosting productivity. To back up teaching and learning even more, the department made the ePortal -a online centre full of educational materials linked to the Curriculum and Assessment Policy Statement (CAPS). It helps both the teacher and the learner: Lesson plans, assessments, and multimedia content for teachers; Supporting materials that reinforce classroom lessons for learners. Easy discovery of quality resources, curriculum aligned, builds confidence among teachers using digital tools and tools being valuable in day-to-day instruction. By making quality resources easy to find and curriculum-aligned, the ePortal builds teachers’ confidence in using digital tools and reinforces their value in day-to-day instruction. By these interlocking work streams, the WCED does not just embrace technology but rather tweaks an ecosystem reflective of thoughtfulness and responsiveness in support of teaching within the 21st century. For Grade 7 educators particularly, this means lessons that are more engaging, better practices, a classroom experience that is connected.

2.4 The capabilities required for teaching using digital technology

It is a demand of modern educators that they apply technology with their teaching strategies. Teachers should have information about specific subject areas; in addition, they should be conscious of good pedagogy to teach and promote learning effectively inside the classroom. According to certain theories, digital competence is a collection of skills, dispositions, and methods required to do various ICT and digital media tasks.

Digital competence is widely acknowledged as a multidimensional construct. Ferrari (2012) defines it as the components of knowledge, skill, and attitudes toward critical usage of digital tools. Redecker (2023) emphasize the need to match digital competence with pedagogical goals. As aptly captured by Moila (2024), training is very technical and not much pedagogical. This goes a long way in informing an inquiry that seeks to find out if teachers know or do not know not only how to operate digital devices but also how to use them meaningfully in the delivery of the Grade 7 curriculum.

Lee Shulman first introduced the idea of Pedagogical Content Knowledge, or PCK, back in 1986. He described it as an understanding of how to teach specific subject material. In 2006, Mishra and Koehler went further by introducing the element of technology knowledge into PCK when they proposed TPACK - a merging of technology-based pedagogy and content expertise.

Shulman, (1987:9) suggests that for successful implementation of digital technology in education, teachers should not only be informed about the topics they are teaching, but also have an understanding of instructional methods. This means having a good grasp of learning theories, differentiating instruction, and developing appropriate grading practices.

Crippen & Archambault (2012) propose that the integration of educational technology into curriculums be done due to the potential influence it can have on students' scientific knowledge and interests in STEM fields. Further, as technology advances and online experiences become ever more prevalent, teachers should recognize these changes by increasing demands for digital literacy skills from their pupils, as well as aspects such as user interface which could help cultivate positive learning outcomes. A study by Falloon (2020) indicated that “teachers play a critical role in fostering digital literacy skills, ensuring students develop competencies in navigating, evaluating and using digital tools effectively”. It has been suggested by Margot and Kettler (2019) that “exposure to technology-rich environments positively influences students’ problem-solving abilities and their interest in STEM careers.”

Mishra and Koehler (2006) suggested that by leveraging the combined power of technology, content, and pedagogy, teachers could create a meaningful learning experience for their students as well as foster an effective instructional approach. Mishra and Koehler (2006:1028) assert that for technology integration to be more than just having access to tools and resources, instructors must be able to integrate technology pedagogical topic knowledge into their instruction in an effective and efficient manner. Mishra and Koehler (2006) emphasized that teachers must be equipped with the capability to integrate technology pedagogical content knowledge into their instruction, otherwise technology use would just result in providing students access to tools and resources.

Apart from their calling of becoming efficient and proactive, the emergent 21st-century teacher should acquire the four c's (communication, collaboration, critical thinking, and creativity). Therefore, in conjunction with the TPACK, model it is imperative that educational institutions also make sure that the (SAMR) model of substitution, augmentation, modification redefinition are adhered to so that the integration of the technology can become part of the emergent 21st century teachers' everyday practice.

Tunjera and Chigona (2020) claimed that pre-service teachers may not be adequately knowledgeable to effectively use technology for teaching. The authors postulate that successfully implementing digital tools in instruction goes beyond merely accepting them, but rather involves systematically utilising the TPACK model and SAMR framework with the intention of achieving educational objectives. Furthermore, they pointed out the situation among practising educators where there is a widening gap between school teachers and newer technologies connecting to curriculum delivery.

2.5 Teachers' integration of digital technologies into their pedagogy

Blended learning, flipped classrooms, and collaborative online tools are among the strategies that have been facilitated as part of digital integration. While literature articulates their possible benefits (Ogbonnaya, 2019), recent studies emphasize that success emanates from contextual adaptation. For instance Nyathi and Joseph (2024) indicate that training has to be subject-specific and concurred infrastructural disparities between strategies (Chomunorwa et al., 2025). This validates that strategies cannot be generalised but rather have to be responsive to the context of teachers and needs of learners. Instructional technology, also known as digital learning is the practice of learning while using a digital device, according to Park (2011:79).

Instructional technology has been very useful in eliminating what used to be major barriers to learning: primarily cost and geographical distance. As noted by Learning Light (2022) it permits individuals located at remote or otherwise inaccessible areas to

maintain a liaison with institutions. Furthermore, digital technology provides learners with greater flexibility since they can access learning materials in various changing locations at a quicker pace. A study conducted by West (2020) found that “the integration of digital devices into education enhanced accessibility and engagement, allowing learners to study at their own pace and convenience”.

Research on using video games as an educational tool has found that playing them could potentially help improve communication and concentration. However, Becker (2016:337) warns against relying solely on this approach in teaching, remarking that not everyone may find a lesson enjoyable just because it involves gaming.

The use of instructional technology strategies has yet to be fully explored in disadvantaged areas for curriculum delivery. Educators and parents tend to view the presence of digitals in schools with disapproval, but this should not impede efforts from the Department of Basic Education for its implementation. Providing a digital learning approach could significantly benefit our learners who come from underprivileged environments.

Yau & Joy (2014) conducted a thorough examination of digital learning and its various implementations, like sites, apps, and SMS-based training picking benefits and possible downsides of each way in their study. The authors also ascertained that greater access to digital devices is essential in order to achieve successful implementation of digital learning initiatives. Various strategies were proposed by Yau and Joy (2014) for optimizing student engagement through the effective usage of these devices under different educational settings.

They emphasize the value of producing engaging, interactive and pertinent experiences for learners through this learning medium.

Furthermore, the authors point to a few issues that arise with digital learning such as compatibility among devices, internet connectivity and user privacy. They discuss how it's important to have policies and regulations for digital usage in educational environments along with further training for teachers and students alike.

The education department should invest in creating digital applications that is subject specific and interactive so that all learners could benefit from the ubiquitous nature of digital technology. Selwyn (2019) however noted that “while digital learning offers flexibility and accessibility, challenges such as digital literacy gaps and internet connectivity disparities must be addressed to ensure equitable learning opportunities.”

In this era of growing technology, 21st century educators should apply TPACK in their classes to foster more effective teaching approaches. Teachers need to take risks while

expecting the highest standards from students which can subsequently lead to improved student performance. Apart from that, teacher self-efficacy is also associated with job satisfaction, student engagement and enthusiasm for learning as well as creative ideas. (Moe et al., 2010),

This study will investigate how teachers are prepared to use digital technology in their lesson plans for delivering the curriculum in Grade 7.

2.6 Digital Technology integration in classrooms

Digital devices are regarded as important preparing learners for the demands of the 21st century. Studies have affirmed their potential in enhancing learner engagement, fostering collaboration among learners, and making it easy for differentiated instruction (Ertmer & Ottenbreit-Leftwich, 2019). However, lessons drawn critically indicate that without the proper pedagogical framing, devices may be used just superficially to transform learning rather than changing learning (Moila, 2024). This indicates that an evaluation of not just the presence of devices but also the ways in which teachers perceive their competence to use them effectively is highly significant for Grade 7 curriculum delivery. Classroom teachers occupy a very central role in steering students towards the realization of the digital technology potential that is inherently transformational. As Chigona (2017:23) puts it, "it is the responsibility of educators to foster an awareness that digital technology possesses the dual capacity to advance innovation and collaboration or, conversely, to mislead and distort". In turn, this means that within that classroom setting, critical use of digital devices has to be established for purposes of developing critical thinking, creativity, and problem-solving abilities among learners (Watson, 2015). Digital tools allow students to be creative and self-directed seekers, supporting the construction of knowledge. In the view of Madoda and Chigona (2018), increasing use of varied digital technologies in education perpetuates a techno-centric outlook that considered these tools capable of changing learning environments. Such tools are considered central to facilitating learner-centred pedagogy wherein the learner seeks to make personal meaning by connecting new digital experiences with an old knowledge base. This is relevant to (Jonassen, 2017) constructivist orientation since he perceived linking prior experience with new learning as making understanding possible and able to be retained. Also, having online materials helps with getting many kinds of learning tools and working together, this makes better learning surroundings. As per Brown and Green (2017), the natural way digital technology can boost student interest greatly helps to make teaching and learning results better. This thought is backed by Mishra and Koehler (2006) whose TPACK framework shows the need to mix technology in ways that fit with subject matter and teaching for proper instruction. In like manner, Selwyn (2012) argues that the significant incorporation of digital tools

implies that educators need to have an essential condition for adopting technology: to critically assess its relevance and potential educational value. In this sense, digital technology becomes a catalyst for pedagogical change rather than an adjunct component. It is also noted by Ertmer and Ottenbreit-Leftwich (2010) that the beliefs of teachers about technology are the most critical factor in successful integration; hence, professional development has to be designed that shall instill competence as well as confidence in the use of digital tools.

2.7 Barriers to integration of digital technology

A dominant theme that comes forth is the persistence of barriers to digital integration. Some of the issues noted by Isaacs (2020) include infrastructure, net set up and insufficient devices ready for use. Training has been viewed as generic by educators as reported by Nyathi and Joseph (2024) and not related to real subject-specific needs even when access was made available. Further support is derived from Moila (2024) who found that teachers do not have pedagogical strategies for integration even when basic technical competence can be assumed. Therefore, this insight informs that the barriers are not just material but also pedagogical and contextual. As warned by Chomunorwa et al. (2025), projects may glide over systemic inequities thereby leaving some schools inadequately prepared in meaningful digital integration.

The barriers that shape the perception of educators and affect the success of integrating technology have everything to do with the immense potential that digital technology has in transforming classrooms and improving learning but will not get rid of existing barriers. These comprise the inadequate infrastructure and resources, professional development, time constraint, pedagogy resistance, and equity issues. Overcoming these barriers and mitigating their effects is important in creating a digital learning environment. It thus makes teachers feel unready, insecure, and unwilling to use technology in their lessons. Inadequate infrastructure poses a very big challenge against classroom technology integration. Many schools struggle with very basic things like equipment; internet connectivity; and digital devices, particularly those in under-resourced areas (Abedi & Ackah, 2023). Practical challenges hence accrue on educators in trying to leverage effectively on technology without basic infrastructural support.

These barriers prevent them from being able to try out and take on new teaching methods, which helps to form the wrong idea that digital tools are not useful or hard to get. Adult learning is key to successful technology use but misses much of its training in real needs. Brackett (2024) observes that most workshops dwell on mere theories and do not go ahead to teach how to use digital tools in particular subject areas. It is contextual professional development that helps to build the confidence and

competency of educators in the use of digital technology. Time constraints add to the many challenges that educators face. Time pressures compound the problems of teaching. Teachers have so many existing duties to perform that there is hardly any time left to plan, learn, and carry out technology-enhanced lessons. According to Ruhogo et al. (2022) integration of digital tools has meant a lot of lesson preparation time, troubleshooting, and skill development which cannot easily be matched with the teaching load by most educators. The unavailability of such time can kill enthusiasm and make technology perceived as an extra burden rather than an available resource. As noted by Ruhugo et al. (2022), disparities in students' digital literacy and access to technology form very formidable barriers against the just integration of technology. In poorly resourced schools, teachers may withdraw the use of digital tools fearing that it will further increase disparities already existing within the school. For instance, students who do not have devices and internet connectivity at home are disadvantaged when assignments to be done at home require technology. Such inequities add more stress onto educators who then view technology as a dividing rather than a uniting tool. The barriers, to integrating technology profoundly shape the attitudes and perceptions of educators.

Different Responses: Teachers have different feelings towards digital tools. Some embrace technology as a hooking element to create interactive and engaging lessons while meeting different learning needs and some are just cautious and use technology selectively or not at all. The latter emanates from an internal struggle between the perceived benefits fighting against limitations of being systemic.

Support Systems: Schools that have good leadership and strong professional support can create positive views about technology. A supportive environment enables teachers to see the digital tools as chances to improve learning and not as hindrances (Ruhogo et al., 2022). Working together and mentoring also pushes teachers to check new practices.

Equity Issues In low-resource settings, educators are more disposed to wariness towards technology; their fear is that it will increase the inequalities that already exist between the learners. This view underscores the imperative for systemic support in the advent and guarantee of equitable access to digital tools and resources.

The attitude of teachers towards the use of technology significantly determines its acceptability and further application. As stated by Bladergroen et al. (2012), in a good way, teachers' willingness to embrace ICTs has everything to do with the proper implementation of all initiatives concerning ICT, making them "key" to successful integration of technology in education. However, you cannot force a teacher or any person to have a positive or negative attitude toward technology. Personal feelings are

very individual and require an equal combination of extrinsic as well as intrinsic motivators. Obstacles to the use of ICT, however, stand to reason that they may also act as deterrents against the use of ICT in instruction and learning. The motivational reasons that Chigona et al. (2014:1) found were as follows: Getting joy from using ICT; the tasks and hopes set on teachers; and having a feeling of success.

2.8 Possible solutions to integration of digital technology at primary schools

Targeted professional development, continuous mentorship, and school-level support systems are among the many solutions that have been proposed by various scholars. For example, Nyathi & Joseph (2024) propose subject-and grade-specific training. confidence building in training for teachers is very important, as indicated by Chigona, (2015). However, adequate responses to infrastructural and systemic inequalities should be components of any solution; otherwise, professional development will serve to further entrench existing divides, as argued by Chomunorwa et al. (2025). This indicates that a holistic technical training and pedagogical support approach integrated with equitable resourcing is required. It should be noted that availability and accessibility of ICTs do not guarantee the adoption and use by teachers. It is assumed that instructors' attitudes coupled with their support will lead to the success of all efforts directed towards ICT (Rana, 2012). The major hindrances to the utilization of ICT are finances, skills, and infrastructure. Padayachee (2017) suggested giving pre-service teachers better teacher training and offering ICT courses to practicing teachers. According to Tondeur et al. (2016), schools with support systems for teachers that help them use technology in class, like policy planning, peer help, and digital technology support, have a good impact on this. It was discovered by Hayes (2005) that the principal's involvement in pushing teachers to use digital technology in their lessons becomes advantageous if the process of integration is directly related to the learning goal of the school. Support from the principal for educators is expected to happen through professional development initiatives being implemented (Hayes, 2005). To this, Tondeur et al. (2016) noted that teacher beliefs reinforces peer support, and teaches share ideas with each other on how to use digital technology to make student-centered teaching better. The majority of teacher education students; according to Chigona (2015:244), "still lacks the technology pedagogical content knowledge which is necessary for one to be able to appropriate ICTs into curriculum delivery, even though they have the technological skills to operate digital technology." As per the findings of the study, it was discovered that teachers have not been adequately trained on how to use digital technology for curriculum delivery in their classrooms (TPACK) (Akcaoglu, &

Rosenberg, 2013). Proper training helps increase the use of digital technology by teachers in classrooms. (Glazer et al., 2005).

2.9 Theoretical Framework

The Technological Pedagogical Content Knowledge framework, by Mishra and Koehler (2006), is holistic in analyzing teachers' digital competence. The TPACK model proposes that successful integration involves a balance between content, pedagogy, and technology knowledge-notes. Even though it has gained widespread application, critics argue that the TPACK model does not adequately respond to contextual challenges whereby there are infrastructural disparities (Chomunorwa et al., 2025). However, this model serves the purpose of our study well as we try to delve into Grade 7 educators' perceptions about their level of digital competence in delivering curricula. As digital technologies come to be involved in all spheres of daily life, adequately working out the way for successfully incorporating technology within the teaching process stands as the primary objective for any teacher and education policymaker. The TPACK framework-Technology Pedagogical Content Knowledge (see Figure 2.2) serves comprehensive modelling that comprises all forms of knowledge required by teachers to successfully integrate technology into their teaching. (Mishra and Koehler, 2006) added Technology Pedagogical Knowledge to the equation of Shulman's Pedagogical Content Knowledge (Shulman, 1986).

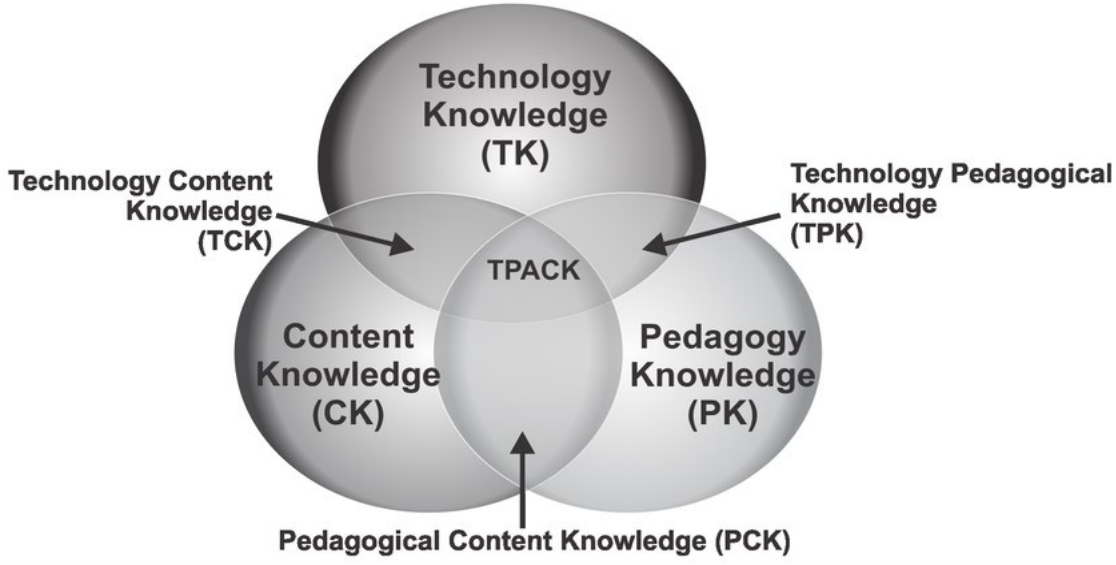


Figure 2.2: TPACK the model (Mishra & Koehler, 2006)

Mishra and Koehler, (2006) updated this model by adding technology as a third area, creating it a three-part model where the overlaps between content, pedagogy, and technology form the center of comprehension how educators can successfully merge digital tools into their teaching. The TPACK framework draws from these major components: Content Knowledge by educators about the content to be delivered

(Shulman, 1986); Pedagogical Knowledge of how and what to deliver inclusive of classroom management, lesson planning, and assessment strategies (Mishra & Koehler, 2006); Technological Knowledge about and skillful application of web-based tools and applications for instruction (Koehler et al., 2013). The approach for successfully delivering certain content is known as Pedagogical Content Knowledge (PCK). Technology's ability to display and enhance certain content is known as Technology Content Knowledge (TCK). Technology Pedagogical Knowledge (TPK): The way technology can help or alter teaching and learning styles. Technological Pedagogical Content Knowledge (TPACK): Ability, fully integrated, of how one teaches particular content with appropriate pedagogical methods and technology. The worldwide move toward digitalization in education forced teachers to re-conceptualize how teaching and learning take place within classroom settings. It has been triggered by the increasing use of digital devices and online learning environments that were integrated into the educational process. Hence, teachers are now required to acquire and show new competencies so that they can effectively embed technology into curriculum delivery.

2.9.1 The seven components of TPACK

Technological Knowledge (TK): Definition and scope. TK means skill with electronic gadgets, programs, sites, and the growing field of learning tools. Not just a fixed set of abilities but rather the agile strength to pick up different tools, solve problems, choose right apps, and handle tasks linked to online teaching setups.

Evolving teacher competencies. TK currently encompasses (but is not limited to): using interactive whiteboards, cloud-based collaboration, managing student privacy and digital safety, choosing suitable educational apps, managing learning management systems (like Google Classroom), and basic device operation (tablets, laptops). Importantly, TK involves pedagogical deployment decisions (when and why to use a tool), not just operational knowledge.

In well-resourced schools in the Western Cape, teachers are using interactive whiteboards to annotate texts in real time or Google Classroom to assign work and to collect work back. In other contexts, teachers are relying on tablet programmes from projects like Khanya or using offline resources on low-cost Android tablets and USB flash drives. The variation proves how much TK depends on infrastructure and access.

Content knowledge (CK): Definition and scope. Pedagogical knowledge falls within content knowledge, or rather to be more specific, an understanding of subject matter together with its structures, representational forms, typical misconceptions, and progression of ideas within a certain discipline. Technology can drastically influence the

way content is represented and explored. Useful simulations for science (molecular motion, forces) that normally help visualize phenomena which are difficult to understand abstractly; dynamic geometry software and manipulatives available for use by mathematics (virtual fraction bars, number lines); multimodal texts through which corpora assist tools analyse patterning in language use.

In Grade 7 in South Africa schools are using Mathematics Curriculum Online (MCO) to facilitate the different concepts of Mathematics via quizzes and quest models to try out different hypotheses and which gives immediate feedback thereby shifting the teacher's role to Facilitator of Inquiry as opposed to just showing steps.

Pedagogical knowledge (PK): Definition and scope. PK involves teachers' knowledge of learning theories, classroom management, instructional strategies, assessment, and ways to attract learners' attention. When integrated with technology, PK includes the knowledge of blended learning designs and flipped-classroom strategies, digital means of conducting formative assessment, differentiation through adaptive software, and online classroom management.

With digital tools, assessment becomes continuous and formative (e.g., LMS quizzes). Management includes digital norms and policies on device use. Mediation happens through collaborative documents or forums. In the blended and flipped-learning models, direct instruction is conducted outside class, by video or narrated slides and inquiry plus feedback take place inside the classroom.

In South Africa for example, a Grade 7 teacher who uses pre-recorded short lessons (flipped) and class time for problem-solving in groups is demonstrating PK that has been reconfigured by technology. Online quizzes can pick up misconceptions early on and inform the differentiated tasks that are done in class.

Pedagogical content knowledge (PCK) is the term used to describe instructional techniques that successfully impart or assist students in learning the particular subject matter. The best methods for teaching particular subjects, such as scaffolding techniques and typical student misconceptions, are still the main emphasis of pedagogical topic knowledge. When pedagogies are blended with content and technology, PCK informs which tasks are pedagogically appropriate.

Technological content knowledge (TCK): Technological content knowledge refers to how teachers can manipulate various technologies to help students practice and learn concepts in a specific content area in new meaningful ways. TCK is Technological Content Knowledge describing how technology can provide new representations of content. Examples include the use of spreadsheets to model data in science or simulations to show physical systems.

Technological pedagogical knowledge (TPK): Technological pedagogical is how teachers can integrate various technologies and methods into teaching and how those technologies can change teachers' teaching for the better. TPK is knowledge of how teaching and learning change when a certain technology is used. For example, management strategies for group work will differ if students are working on shared documents.

Mathematical Application and Investigation (TPK + TCK + PCK), A fraction application (TK) being used by a Grade 7 educator allows students to make and check equivalent fractions. An investigation problem (PK) is posed by the educator wherein the learners have to predict, test, and explain (CK). The lesson will primarily be based on the interaction of these three domains.

Technological Content Knowledge, and Pedagogical Content Knowledge. To teach energy transfer, a simulation (Technological Knowledge/Technological Content Knowledge) is used by the teacher in such a way that learners can manipulate different variables. PCK guides questioning and assessment.

The term TPACK describes the ways by which educators integrate technology into their teaching practices across all disciplines. With this knowledge, educators are supposed to understand very well the dynamic and intricate relationships among the three major areas of competence (TK, CK, and PK).

This will thus enable them to use appropriate methods and tools for imparting content, .the revised version of the TPACK model (figure 2.3) includes XK. The outer circle or the Contextual Knowledge (XK) would be everything from the awareness of technologies, knowledge specific education policies prescribed by the education department and country, according to Petko, Mishra& Koehler (2025).

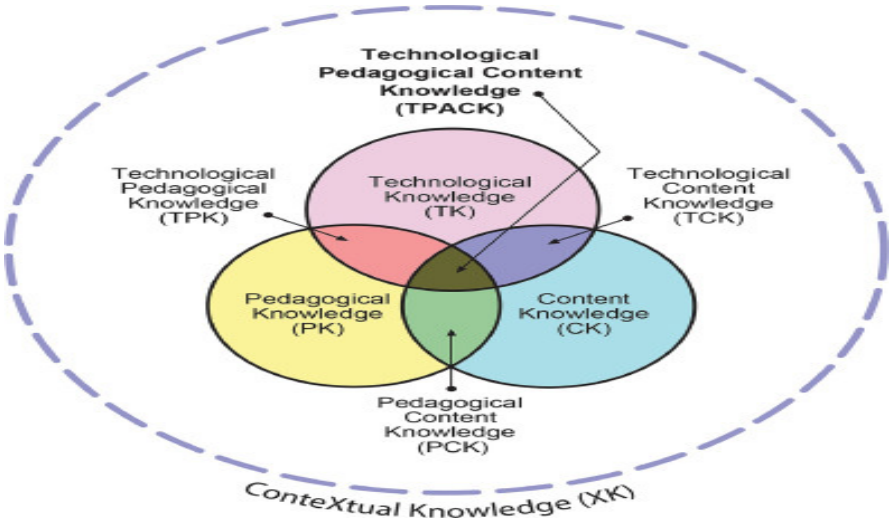


Figure 2.3 TPACK model Adapted from Petko, Mishra & Koehler, 2025.

In South Africa, such an expectation is institutionalized by national policy frameworks: for example, the Department of Basic Education (DBE) Teacher Competencies for Digital Learning Framework (2014) and the National Framework on Digital and ICT Integration (2021). Despite momentum of policies, South African schools continue to grapple with contextual realities—unequal infrastructure within the same school, inconsistent set up of internet access, and varied readiness of teachers as per assumed training on digital integration in classrooms (Padayachee, 2017; Tunjera & Chigona, 2020). It is in this same context that the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006) may be considered most apropos conceptual modelling when analysing the digital competence of educators. TPACK, in its formulation, underscores how knowledge regarding technology (TK), pedagogy (PK), and content (CK) dynamically relates to certain specific contextual factors. A review of theoretical underpinnings, critical debates, and empirical applications of the TPACK framework will be conducted with specific references to the South African environment. Another focus is on how TPACK informs teacher professional development and curriculum design as well as digital equity for Grade 7 educators who have a mandate to use digital tools in delivering literacy and mathematics lessons.

2.9.2. Basics of TPACK Theory

The TPACK model builds on (Shulman, 1986) the original idea of Pedagogical Content Knowledge (PCK). He said that good teaching needs more than knowing content and pedagogy apart it also requires the skill to merge them in a useful way. Mishra and Koehler (2006) extend this by adding the knowledge of technology, saying that contemporary instruction requires knowing not only what to teach and how to teach it but also which tools support learning more effectively. TPACK consists of seven components knowledge. These are Pedagogical Knowledge (PK), Technological Knowledge (TK), and Content Knowledge (CK). They have been called Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK) Integrated, and Technological Content Knowledge (TCK) The seventh component includes the Context Knowledge (XP).

The best way to understand TPACK is not by thinking about these as separate, static compartments but rather as a dynamic system. Teachers modify and readjust the content of these boxes whenever new technologies and models of pedagogy become available. In practice, this framework helps explain why some teachers can embed technology effectively; changing learning and the other group just use it to replicate traditional learning. It also lays a basis on which an analysis of professional

development can be carried out so as to identify the domains of knowledge that educators need to strengthen for holistic integration.

2.9.3 Technological Knowledge (TK): Evolving Teacher Competence

Technological Knowledge comprises the skills, abilities, and competencies that a teacher possesses in using, managing, and adjusting digital artifacts — beginning with hardware, for example tablets and interactive whiteboards, and including software applications and online platforms. With the growth of digital technologies, TK should cover not only the competence to operate but also the ability to critically assess educational technologies and consciousness regarding their data privacy, accessibility, and ethical use. In the South African context, many educators portray functional TK but not fluent to apply it creatively or critically (Padayachee, 2017). Schools in the Western Cape urban area implemented platforms such as Google classroom and Microsoft teams to facilitate blended learning. In some rural schools that are under-resourced, shared devices or simple mobile applications are being used (DBE, 2021). Chai et al. (2013) reaffirm in their study that teachers' technological knowledge develops through continuous exposure, experimentation, and reflective practices. Thus, one can infer that training confined to the operation of devices conducted in isolated instances does not contribute much toward the sustenance of TK development. Workshops in South Africa enable teachers to "use" tools but not how they should be integrated into teaching for its purposeful utilization. Also, growing digital setups—made up of AI-helped sites, learning management systems (LMSs), and tools for adaptive learning—require teachers to keep updating their TK. As Redecker (2023) points out, being digitally skilled today means more than just knowing how tech works; it includes understanding its teaching uses, limits, and effects on student control.

2.9.4 Pedagogical Knowledge (PK): Digital Pedagogy in Practice

Pedagogical Knowledge refers to teachers' knowledge of teaching strategies, the learning process, assessment, and classroom management. It becomes digital pedagogy when related to technology as the competence to apply digital tools in creating, delivering, and assessing learning experiences. Digital pedagogy develops a learner-centered environment from what was previously a teacher-centered setup where learners can obtain lecture material online and work on problems with the teacher present in class. Flipped learning is basically blended face-to-face with digital modes that are characteristic of the 21st-century education setup. But studies say most South African educators continue to dwell at the substitution stage of the SAMR model, just allowing technology to do work that was previously done without it (e.g., typing assignments) rather than changing pedagogy. Recent study observations shared in classrooms reveal teachers' heavy dependence on PowerPoint presentations or videos

as lessons support material and hardly ever use digital tools for collaboration, inquiry, and even formative assessment. This narrow pedagogical integration forms part of the broader gap in professional development of teachers. Workshops and general digital literacy initiatives focus more on software navigation than on instructional design (Padayachee, 2017). For the development of robust PK, opportunities should be provided for teachers to explore how digital tools support constructivist learning, formative assessment, and differentiation of diverse learner needs. In this respect, the e-Learning Game Changer in the Western Cape is a good example; it focused on content and interaction for online collaboration which falls under the PK dimension of TPACK. However, its reach across schools has not been very effective.

2.9.5 Content Knowledge: Rethinking How We Deliver Curriculum

Content Knowledge is defined as teachers' mastery of the subject matter they teach and their ability to organize it for effective learning. Technology reshapes CK because it changes the way representation, access, and construction of disciplinary knowledge is made. For example, simulations will be described as tools available to scientists for visualizing molecular interactions; mathematical manipulatives include GeoGebra and dynamic problem-solving among others; multimodal platforms such as Padlet or Canva allow literacy learners to express ideas creatively. The integration of technology into CK means teachers have to know more than just their subject areas; they must be able to use digital tools to enhance conceptual understanding. In South African schools, it is mathematics and science teachers who are users of visualisation software that improves both learner engagement and conceptual clarity. Challenges relate to issues of access and sustained training. The CAPS curriculum (DBE, 2014) makes provision for the use of multimedia resources and interactive simulations towards conceptual learning but teachers are finding it difficult to align these resources properly with the outcomes of the curriculum (Chigona, 2015). This creates tension that further stresses the need for an understanding of how content knowledge can be integrated with technology knowledge. Technological Content Knowledge (TCK) in TPACK addresses this component. Content Knowledge does not remain unchanged as digital tools reframe disciplinary boundaries. For instance, digital storytelling in English may now include multimodal composition and online peer review, broadening literacy. In the same way, science and mathematics are becoming ever more dependent on data visualisation and coding areas in which pre-service teachers need to reconceptualise content structure and assessment criteria.

2.9.6 Intersections of Knowledge Domains (TPK, TCK, PCK, and TPACK)

The meeting points between TPACK domains reflect the integrative thinking that effective use of technology requires. Technological Pedagogical Knowledge (TPK) is

knowledge of how technological tools influence the teaching and learning process, such as an interactive quiz tool being used to enhance formative assessment. Technological Content Knowledge (TCK) is knowledge of how technology represents disciplinary ideas differently; for example, simulations enable exploration of fractions in mathematics or digital manipulatives demonstrate geometry. The knowledge of Pedagogical Content Knowledge (PCK) is still very critical since this is the knowledge of method selection and content. The culmination of these intersections is what TPACK reflects- that teachers can orchestrate all three domains so fluidly in practice. Teachers who have strong TPACK lesson plan learning experiences with digital tool integration purposely to fulfill curriculum goals. For example, a Grade 7 mathematics teacher may introduce an application on the tablet to represent a lesson on fractions through inquiry by allowing learners to manipulate visual models and make hypotheses. In the same way, a literacy teacher can use digital storytelling platforms; learners co-create narratives with these tools merging their fluencies of technology with creative writing pedagogy. Studies out of South Africa (Tunjera & Chigona, 2020; Nyathi & Joseph, 2024) support this by showing the fact that teachers in most schools fail to apply such high levels of integration because access is not uniform and adequate support related to pedagogy is provided. Thus, the challenge does not stop at the effort to build individual competence but extends to establish systemic support structures that help teachers merge TK, PK, and CK effectively.

2.9.7 TPACK in South African context

The TPACK model which foregrounds the integrated knowledge a teacher needs to teach content effectively with technology (Technological Knowledge, Pedagogical Knowledge, Content Knowledge and their intersections), maps directly onto South African policy priorities that combine teacher capacity building, curriculum alignment and infrastructure provision. The Department of Basic Education's Professional Development Framework for Digital Learning sets out a teacher-centred approach to digital learning that positions professional development as the mechanism through which educators acquire digital competencies to "use ICTs to enhance teaching and learning" and to develop curriculum-aligned digital resources and practices. This emphasis on teacher competence, curriculum alignment and staged professional learning corresponds to TPACK's focus on integrated teacher knowledge (TK + PK + CK). (DBE, 2018)

The Western Cape's e-Learning Game Changer and the WCED Vision for e-Education act as practical implementations of these policy priorities through coordinated streams (eCulture, eInfrastructure, eAdmin, eTeachers, and eContent) toward "well-trained eTeachers using eTechnology and eContent in their lessons." By expressly naming

teacher capability (eTeachers), curriculum resources (eContent), and infrastructure (eInfrastructure) as interdependent programmatic streams, the WCED strategy reflects the actual system-level conditions that make TPACK enact able in classrooms. Where delivered together, these streams help teachers develop TK (tool fluency), PK (blended and digitally mediated pedagogies), and CK (subject-specific digital resources mapped to CAPS). At national strategy level, recent digital/ICT strategies (national digital skills and ICT integration documents) insist that digital skills and infrastructure planning must be embedded across education systems, again reinforcing the three pillars that enable TPACK development:

(1) Teacher professional learning pathways (building TK and TPK),

(2) Digital content and assessment aligned to curriculum standards (CK + TCK), and

(3) Reliable infrastructure and policy to scale practice (contextual enablers).

These national plans therefore provide a policy scaffold that supports TPACK as both an analytic and implementation framework. (WCG, 2016)

The South African education system deliberately adopted digital learning into its methodological and assessment strategies. In 2014, the Department of Basic Education (DBE) released its framework on Teacher Competencies for Digital Learning. Competencies to be described include digital literacy, collaboration, and professional engagement of the educator needed in the 21st century.

Another framework advocating more firmly for the systematic infusion of ICTs across curricula toward equitable access and innovation in teaching is the National Framework on Digital and ICT Integration (DBE, 2021). The Western Cape Education Department (WCED) initiated the e-Learning Game Changer (2016–2024), a provincial drive designed to embed e-learning at schools by means of enhanced infrastructure, digital content, and professional development. The South African model sets up its model very much within the principles of TPACK, disparities of infrastructural imbalances plus teacher readiness from district to district have caused unevenness in its implementation. Previous efforts like the Khanya Project (2001–2012) and the e-Vision for e-Education in 2004 attempted to build up ICT infrastructure and promote digital pedagogy at schools across South Africa. These efforts laid down some useful foundational ground but were also criticized for a focus that swung too much toward hardware delivery rather than on changing pedagogy. TPACK provides an appropriate analytical lens through which it can be seen why such projects typically fall short of making any real difference: they improved Technological Knowledge (TK) but did not include or integrate Pedagogical Knowledge (PK) and Content Knowledge (CK).

Provincial initiatives help demonstrate how the policy comes into practice and where the gaps lie. Khanya Project (Western Cape) The investment of Khanya in school ICTs- computer labs, and teacher training, among others- proved that big hardware rollouts accompanied by training can shift classroom practice from talk-and-chalk to interactive instruction when resources are available. Evaluations and case studies attribute increased exposure of teachers to technology through Khanya and pedagogical experimentation stimulated by the program (i.e., early gains in TK and some TPK). But long and detailed stories point out some weaknesses which are true to the development of TPACK: unequal provision of apparatus among schools, lack of follow-up pedagogical coaching, support on maintenance and replacement (sustainability) and support to align resources to specific CAPS sequences. These limitations basic TK move to deeper, sustained TPACK because the teachers did not have the combined supports (ongoing PD, subject- specific digital resources, maintenance and connectivity) required to embed new pedagogies. In summary: Khanya advanced TK exposure but did not uniformly secure the sustained, curriculum-embedded PD and infrastructure continuity that would flow into full TPACK integration. WCED eVision / eLearning Game Changer articulate a more program-level architecture by explicitly merging eInfrastructure, eContent, and eTeachers as coordinated streams. In those districts where the Game Changer delivered smart classrooms, laptops, projectors, interactive whiteboards and broadband or acceptable connectivity plus targeted PD there is evidence already of very significant gains of a TPACK-type: teachers could access curriculum-aligned eContent (supporting CK and TCK), experiment with blended models (PK/TPK), and use device features in lesson delivery (TK). The WCED also emphasizes the development of an “eCulture” a cultural and leadership dimension supporting teacher collaboration and PLCs (important for sustaining PCK and TPK). However, critical reviews expose the same systemic weaknesses: Implementation has been uneven; schools that were historically disadvantaged often received fewer resources or slower rollouts; and the depth of PD varied across districts. Where the three e-streams were not synchronised (for example, if hardware was provided without curriculum resources or without follow-up coaching), teacher practice snapped back to low-tech routines notwithstanding initial investment. Thus the WCED model illustrates that integrated TPACK development requires coordinated, sustainable attention to infrastructure, content and PD not hardware alone.

2.9.8 TPACK and Teacher Professional Development

A rich body of literature clearly establishes the fact that professional development explicitly marries technology, pedagogy, and content knowledge leads to more sustainable and contextually relevant teacher learning than efforts based solely on

technical skills. "The TPACK framework addresses the problem arising from over-emphasis on technological knowledge in many ICT courses that are conducted in isolation from teachers' subject matter learning and pedagogical training," note Chai et al. (2013:31). Their review found evidence to suggest that when teachers are coached to draw simultaneously on TK, PK, and CK lesson planning does enhance efficacy leading confidence that can be measured. In support of this claim (Koehler & Mishra, 2009:66). add that "TPACK represents a form of knowledge that goes beyond all three core components… and is the basis of good teaching with technology" integrated as such authentic professional learning becomes embedded in real curriculum tasks rather than being learned as some isolated skill. Within the South African context, however, research shows that teachers' exposure to TPACK-oriented PD remains uneven. Tunjera and Chigona (2020:126) report that "teacher educators are appropriating technology in ways harmonious with their prevalent traditional teacher-centred teaching strategies at enhancement levels," indicating that many pre-service teachers acquire only basic TK without developing the pedagogical or content integration that constitutes full TPACK. (Padayachee, 2017:7) national survey of ICT integration similarly concludes that "the majority of teachers integrate ICTs at a superficial level, often using technology as a substitute for existing practices rather than transforming learning experiences." These findings imply that while exposure to devices is increasing, the professional learning experiences that cultivate PCK, TPK, and TCK are still limited. Recent studies further support this argument. As noted by Moila (2024:4) "subject-specific professional development for teachers of mathematics and science seldom addresses how digital tools represent disciplinary concepts, leaving a gap in teachers' technological content knowledge." Equally, Nyathi and Joseph (2024:11) observe that "teacher training workshops in many districts continue to prioritise basic digital literacy at the expense of pedagogical integration aligned to the curriculum." The two studies described herein also emphasize that PD must intentionally stretch beyond learning the 'tools' to the design of learning experiences based on CAPS outcomes. This also runs through the evaluations of Western Cape professional development initiatives: a tension between technical and pedagogic integration. The WCED's e-Learning and eTeacher Programmes are operating a TPACK-compatible architecture, making emphases on eTeachers (teacher competence), eContent (curriculum resources), and eInfrastructure. "E-Teachers are expected to integrate digital technologies effectively in all subjects through curriculum-aligned e-content" (WCED, 2020:18) there has to be an alignment between TK, PK, and CK in the framework too. However, it is apparent from evidence originating from provincial case studies that many workshops have lessons primarily focused on device operation. As Padayachee (2017:9) warned, "Professional development remains

largely techno centric with limited evidence of pedagogical transformation," .When Professional Development combines technological training with classroom coaching and lesson co-design as observed in the more successful Khanya and e-Learning Game Changer clusters, teachers demonstrate stronger TPACK growth and confidence in lesson redesign. These studies underscore raise the critical value of continuous professional learning based on TPACK. In doing so, sustained content specific PD allowed and enabled through digital tools within learning outcomes of CAPS foster teacher efficacy to a deeper level of pedagogical reasoning. Workshops not inclusive of software or hardware proficiency do not address the interdependence of TK, PK, and CK that is required to underpin and support effective Grade 7 curriculum delivery. Professional learning communities co-designing lessons sharing digital content reflecting on practice will be an effective pathway to embed the TPACK principles in ongoing teacher development across South African schools.

Professional development sits as the main enabler of TPACK growth. Studies undertaken across the globe and in Africa have unambiguously confirmed that explicitly designed PD programs on the principles of TPACK contribute to more profound levels of technological integration into teaching (Koehler & Mishra, 2009; Chai et al., 2013). Such programs require the explicit engagement of teachers with all three areas, by means of iterative design and reflection accompanied by peer collaboration. In South Africa, Professional Development (PD) has a disposition to focus more on training than on pedagogical transformation (Padayachee, 2017). Educators are well disposed to the operation of devices and navigation of software, but not usage in terms of teaching strategies or assessment practices that can be used with the aid of technology (Tunjera & Chigona, 2020). These results in high TK but low TPK and PCK knowledge on how to "use" digital tools by educators but not knowledge on applying them easily to help conceptual learning or learner engagement. Professional development that relates to specific subjects is very scanty. Moila (2024) and Nyathi and Joseph (2024) noted that though digital simulations and visualisation tools were appreciated by mathematics and science teachers, structured training was not provided on how to design lessons supported by technology. Therefore, teachers surfed the same wave of confidence in basic ICT use while being unsure about its alignment with the curriculum standards. Professional Development should embrace models of collaborative and reflective learning as against a one-time workshop, thereby enabling sustainable integration. Professional Learning Communities (PLCs), peer mentoring or lesson study groups, work best in the co-development of TPACK competencies by teachers (Harris & Hofer, 2009; Angeli & Valanides, 2013). This community-based learning is in line with South Africa's Integrated Strategic Planning Framework for Teacher Education and Development (ISPFTED) which emphasizes continuous, school-based professional

growth. Effective PD in the South African context shall result from an integration of capacity building (technical skills) and pedagogical visioning (curriculum transformation). Therefore, technology shall be viewed as a support for pedagogy and not a driving force of pedagogy.

2.9.9 Revisiting and Changing the TPACK Framework

While TPACK has become the dominant analytic and design framework for teacher learning with technology, important criticisms have emerged. Perhaps the most common methodological critique is that because in practice the TPACK domains overlap, they create measurement problems. As Brantley-Dias and Ertmer (2013) note, the conceptual boundaries between TK, PK, and CK and especially their intersections are always fuzzy; thus, it becomes complicated to design instruments and interpret scores meaningfully: instruments may measure related constructs or may not capture the dynamic, situated decisions teachers make in real lessons. This problem with construct validity means that researchers using self-report scales or any rubric reduced to this level need to be very cautious about making any claim regarding whether teachers do or do not possess particular elements of TPACK. A second, closely related critique is that classical TPACK treatments under-theorise context. The original diagrams and descriptions somewhat assume a neutral classroom environment, downplaying sociocultural, linguistic, infrastructural and policy constraints that materially shape how technology is used. Not all schools in South Africa are created equal. There is unreliable electricity and limited connectivity. Multilingual classrooms and legacy curriculum demands (CAPS) plus histories of resource marginalisation all determine feasible or appropriate technological pedagogy. Critics therefore call for a model that places context not at the margins but as a constitutive element of teacher knowledge and practice. Recent scholarship has explicitly extended TPACK to force knowledge of context at the front. Mishra (2019) and Porras-Hernández and Salinas-Amescua (2013) extend it with variants often referred to as TPACK+Context or TPACK-X: In these models, an additional knowledge domain is infrastructural, cultural, institutional, and policy factors mediating the use of technology. Following the reformulation by TPACK-X, the original three domains are necessarily situated in context-which means that a teacher's TK, PK, and CK cannot be fully understood without taking into consideration school-level resources, community values and language practices, and systemic constraints. For empirical research purposes, this shift has encouraged the development of multi-method regimes-classroom observation combined with policy mapping using convergence matrices-and analytical strategies treating context as explanatory rather than merely descriptive. Adding to the contextual turn, another strand of critique that has emerged is one which focuses on digital

colonialism and the politics of technology adoption. It is this perspective that problematizes assumptions that imported platforms, content, and pedagogical designs are neutral or universally positive. Much of the digital resources, vendor platforms, and even PD models being applied in South African classrooms have actually been designed elsewhere and exported into local classrooms; they carry with them cultural biases, epistemic priorities plus data-governance arrangements that can reproduce dependency while marginalizing locally relevant knowledge systems. Forcing the TPACK model to include an “XK” (eXternal/Contextual Knowledge, including power and provenance) makes researchers and practitioners consciously reflect: who authors the digital content? Whose pedagogical norms are embedded within the design of a platform? Who benefits from classroom-generated data? That means further adding evaluation criteria to TPACK: not only can a tool represent content but does it represent content in a manner culturally and pedagogically appropriate for South African learners? This framing is not abstract for Grade 7 practice and research. First, PD framed as building TPACK should be designed in a context-sensitive manner (i.e., it should model low-bandwidth and offline pedagogies, prioritize CAPS-aligned resources, and activities that interrogate content provenance and platform governance). Second, triangulation in the measurement of teacher knowledge should include self-report with classroom artefacts and observation as well as contextual indicators (for example access to electricity, device-to-learner ratios, language of instruction). Third, curriculum designers and policy makers should advance a practical step to resist digital colonial patterns by supporting teachers in the adaptation of representations to local languages, examples, and community knowledge through locally curated digital content and open resources. Essentially, moving TPACK on to TPACK-X or TPACK+XK keeps the valuable intuition that the knowledge of content, pedagogy, and technology should be integrated for teaching with technology to be effective but adds what was previously missed: it explicitly places that knowledge in infrastructural, cultural, and political realities. For South African researchers and practitioners, this more expansive model helps explain why identical PD or hardware rollouts produce dramatically different classroom practices across schools and points the way to more equitable, locally grounded interventions.

Though TPACK has become the popular framework, academia has continuously raised critiques about its conceptual clarity and practicality. As noted by Brantley-Dias and Ertmer (2013), since seven areas of knowledge were overlapping, separating empirically measuring them did not become easy in actual practice; differentiating between TK, PK, and TCK could not be very explicit in actual classroom practice. Other scholars noted that the original conceptualization of TPACK placed less emphasis on contextual and cultural factors. The cognitive dimensions were relatively emphasized

regarding the composition of teacher knowledge. The framework hence evolved, with contextual extensions. Most notable among these are TPACK-X and Contextual Knowledge (XK) (Mishra, 2019). The most notable of these are TPACK-X and Contextual Knowledge (XK). These recognize that when and how technology is leveraged and adapted, educators operate within institutional, social, and infrastructure contexts. For example, a teacher's capacity for the integration of digital tools relies on community expectations and policy support and resources as well as building on their own existing skills.

In the South African context, this broader perspective is extremely critical. Local realities from digital divides to language pluralism demand of teachers to make pedagogies adjust technologies for relevance. The advent of XK encourages educators to ask whose knowledge, and indeed which technologies, are being privileged thereby raising issues of digital colonialism (Nyathi & Joseph, 2024). These are tools and frameworks developed in the West that do not consider local epistemologies and resource constraints but rather embed dependency on imported digital ecosystems. A context sensitive TPACK-X model thus provides a more just approach, acknowledging that teachers' digital competencies must always be filtered through the particularities of local culture, language and material realities. Contextualising TPACK in this way transforms it from a ubiquitous model to a living, adaptive framework for classrooms in South Africa.

2.9.10 Empirical Applications of TPACK

Original studies worldwide and from Africa validate the usefulness of TPACK in measuring the readiness of teachers and guiding professional learning interventions. Pre-service teacher competence: Chai et al. (2019) argue that TPACK-based teacher education programs ensure significant development in TK and PK, thus guaranteeing newbies' confidence in applying digital tools. In-service teacher integration: A model for lesson planning based on TPACK was documented by Harris & Hofer, (2009), indicating that structured activity types aligned with the curriculum can enhance teachers' integration efficacy. African context: Challenges of ICT integration in schools across South Africa were highlighted by Chigona (2015) as well as Tunjera and Chigona (2020). The challenges are more prevalent on matters of pedagogy and infrastructural inequities. This has been a continuing trend whereby teachers have strong TK but weaker TPK and PCK, consistent with broader trends in developing contexts. COVID-19 digital pivot: the pandemic made schools do an acceleration of digital learning, thereby exposing the potential and the fragility of teachers' TPACK, (Ngadi, 2024). It was in crises like this that it could be revealed that teachers who maintained balanced TK, PK, and CK were better prepared for varied models of remote

learning. Collectively, all these studies would affirm that TPACK has continued to remain a robust diagnostic and developmental tool for understanding the way teachers have been navigating change technologically. However, they would also underscore the impetus on institutional support to be sustained and contextual.

Focus	Study	Relevance
Pre-service teacher competence	Chai et al (2019)	Demonstrates how training impacts TK and PK growth

Empirical studies show how TPACK can be used as an evaluation model for teacher readiness and simultaneously as a guide for designing professional learning. As noted by Chai et al. (2019:7-9), "when pre-service teachers are supported to reflect on how technology intersects with pedagogy and content, their technological and pedagogical knowledge develop concurrently rather than sequentially," explicit modeling of TPACK connections more effectively teaches lesson planning that can be learned to balance disciplinary accuracy with digital engagement.

Focus	Study	Relevance
In service teacher integration	Harris & Hofer (2009)	Provides model lesson-planning approach.

Harris and Hofer (2009:101) brought TPACK to life by their activity types model, stressing that "teachers plan most effectively when they start with learning goals, then select activity types, and finally identify technologies that best support those activities" . This speaks directly to how in-service professional development would embed TPACK thinking into the design of lessons that are aligned with curricula.

Focus	Study	Relevance
African context	Chigona(2015); Tunjera & Chigona (2020); Ngadi (2024)	Show South African implementation challenges

Chigona (2015:8) states that though teachers value the motivational advantage ICT brings, ‘in the absence of continuous support as well as time and relevant content-specific training, it does not become integrated pedagogically’. Tunjera and Chigona (2020:126) found that ‘teacher educators are appropriating technology in ways harmonious with their prevalent traditional teacher-centred teaching strategies at

enhancement levels' , which indicates there has been limited transformation toward higher-order usage of the TPACK framework.

Focus	Study	Relevance
COVID-19 digital pivot	Ngadi (2024)	Highlights sudden need for TPACK in remote learning.

Ngadi (2024:44) finds that to keep learning going amidst an adversity such as a pandemic, competence in TPACK was necessary: 'Teachers with stronger integrative knowledge of content, pedagogy, and technology were better able to adapt lessons to remote environments using low-bandwidth tools'.

2.9.11 Synthesis and Implications for Grade 7 Teaching

For Grade 7 educators, TPACK synthesizes ways of making a good balance between technological, pedagogical, and content knowledge toward teaching strategies that can become learner-centered and inquiry-driven. Greater cognitive effort at this level pertains to the curriculum; thus, digital artefacts may have to be incorporated thoughtfully to problem-solving endeavours and the journey toward independent learning. In literacy, for example, digital storytelling applications like Storybird or Book Creator enable students to work with text, image, and sound to enhance narrative understanding and multimodal literacy. In mathematics, conceptual interactive applications such as GeoGebra and Desmos allow for visual exploration by manipulation of variables. Therefore, teachers who manage to mix TK, PK, and CK effectively will be in a position to offer inclusive differentiated learning environment strategies that suit the many different needs of learners. Professional Learning Communities (PLCs) offer an implementable model for sustaining the growth of TPACK with Grade 7 teachers. The original design envisaged allowing the teachers to collaborate, reflect, and give peer feedback on lessons that may be co-designed within the PLC and share digital resources aligning pedagogy to CAPS outcomes. Collaborative structures build not only strong TPACK but also a foundation of innovation shared responsibility. Also, putting TPACK ideas into professional learning at the school level can help make curricula more coherent so that tech use meets learning goals and is not just about what tools are there. This way teachers become more than just users of technology but designers of digital pedagogy.

This literature review has considered the development, use, and contextualization of the TPACK framework within the larger conversation about educators' digital competencies in South Africa. The review proves that successful digital integration is not just an issue of technological access but also involves pedagogical expertise,

curricular alignment, and systemic support. The TPACK framework remains one of the very useful theoretical models for analysing the amalgamation by teachers of technology, pedagogy, and content knowledge. However, it requires context-sensitive adaptation to ensure successful implementation. As much as South Africa's policy landscape provides a supportive foundation through initiatives such as DBE (2014) and DBE (2021) frameworks and the WCED e-Learning Game Changer, there is uneven implementation across the country and resource constraints that hinder effective policy implementation. Future directions should aim at growing contextualised TPACK-X models by adding the cultural and infrastructural realness of sustainable digital transformation of schools. For Grade 7 educators, applying TPACK in professional learning communities will make learning the theory in practice and ensure that digital tools genuinely establish a linkage between learner engagement and conceptual understanding. At its heart, useful educational innovation in a South African classroom sits at the meeting place of technology, pedagogy, and content-all held within context.

2.10 Chapter Summary

Chapter 2 looks at the already published work and ideas connected to knowing how teachers view their skills with digital tools, especially in teaching the Grade 7 curriculum. Demonstrated is the fact that while policy frameworks promote digital integration, practical realities reveal infrastructure gaps, inadequate training on systems, and contextual inequities. Recent studies (Nyathi & Joseph, 2024; Moila, 2024; Chomunorwa et al., 2025) further support the view that competence is a function of not only access but also the relevance and quality of support. Concluded in this chapter is the presentation of the TPACK framework as the theoretical lens guiding this study of Grade 7 educators' perceptions. The chapter highlights the growing importance of digital tools in education and explains the need for careful use to fill gaps in education disparities, mainly among less fortunate students in South Africa. The chapter starts by looking at global and local research that probes into the ways digital tools, instructional strategies, and teacher beliefs come to affect technology integration process. From these studies, it is learned that the manner in which professional development engages teachers, institutional support possesses attitudes towards the fostering or hindering of technology adoption all significantly influence the process of technology integration. The TPACK framework (Technology Pedagogy and Content Knowledge) forms an integral part of this discussion since it has been perceived to present a model that bears meaningful digital integration towards actual curriculum goals. The projects of the Western Cape Education Department, which are the Khanya project, e-Learning Strategy, and e-Learning Game Changer, form part of their strategic approach toward modernization in classrooms and supporting digital teaching. These

initiatives have e-Infrastructure, e-Technology/ devices, and e-Culture/ supportive teaching environment as their mainstay where emphasis is mainly on Grade 7. Barriers well-considered include Infrastructure, inadequate training, and time and equity constraints. It is found that teacher readiness and institutional support are essential, respectively, for the successful implementation of technology. The chapter indicates some solutions including teacher training, leadership support, and organized frameworks like TPACK and SAMR that support digital integration. It concludes by elaborating on the theoretical underpinning that the TPACK model has given; thus reinforcing its utility in guiding teachers to effectively mix technological tools with pedagogical and content knowledge for teaching with impact.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

A research methodology offers a mental map that enables the investigator to "discover" the most effective way to tackle research inquiries. Methodology is defined as the "science of finding out" (Babbie, 2015:6). This chapter outlines the research approach used to answer the primary and supporting research questions of this study, namely:

- To explore and understand the teachers' perceptions of educator digital competence for the integration of digital technology during curriculum pedagogy in grade 7.
- to ascertain the degree and manner in which teachers' use of technology for teaching and learning was influenced by professional development, technical assistance, and digital resources; and
- to identify and emphasize how important it is to use technological pedagogical content knowledge (TPACK) for curriculum delivery and how their classroom practice and innovation through technology integration may be impacted by this gained domain of knowledge.

According to Saunders & Tosey (2012), the Research Onion is a metaphorical representation of the components of research methodology. The design aspects are represented by the outer layers, while the considerations for data gathering and analysis are represented by the interior levels (Saunders & Tosey, 2012),

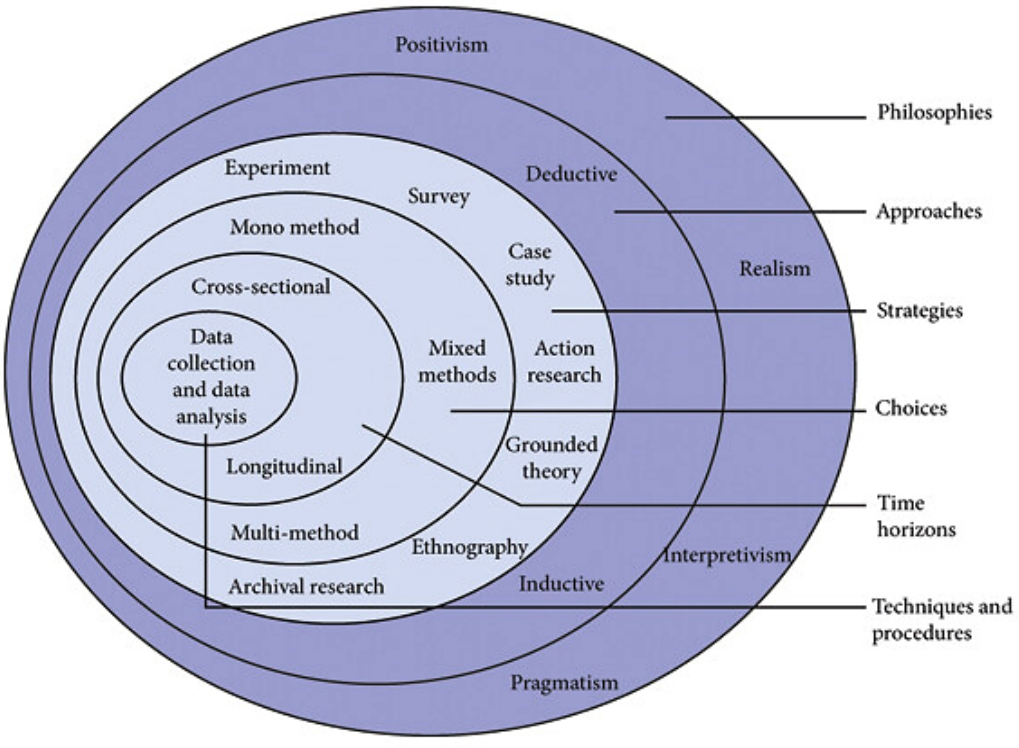


Figure 3.1: The Research onion (Saunders & Tosey, 2012),

Figure.3.1: The Research Onion thus depicts the different judgments and reasoning's a researcher will have to make at the outset of constructing a research methodology (Phair & Warren, 2021). Saunders et al. (2009:106) propose that these critical outer layers must first be "peeled away" before dealing with the centre levels; the aim is to move from the outermost layers inwards, like peeling the layers of an onion.

According to Cohen et al. (2007:78) the objective of research is what drives the choice of methodology and design. The design choices made for this research project are shown in Figure 3.2.

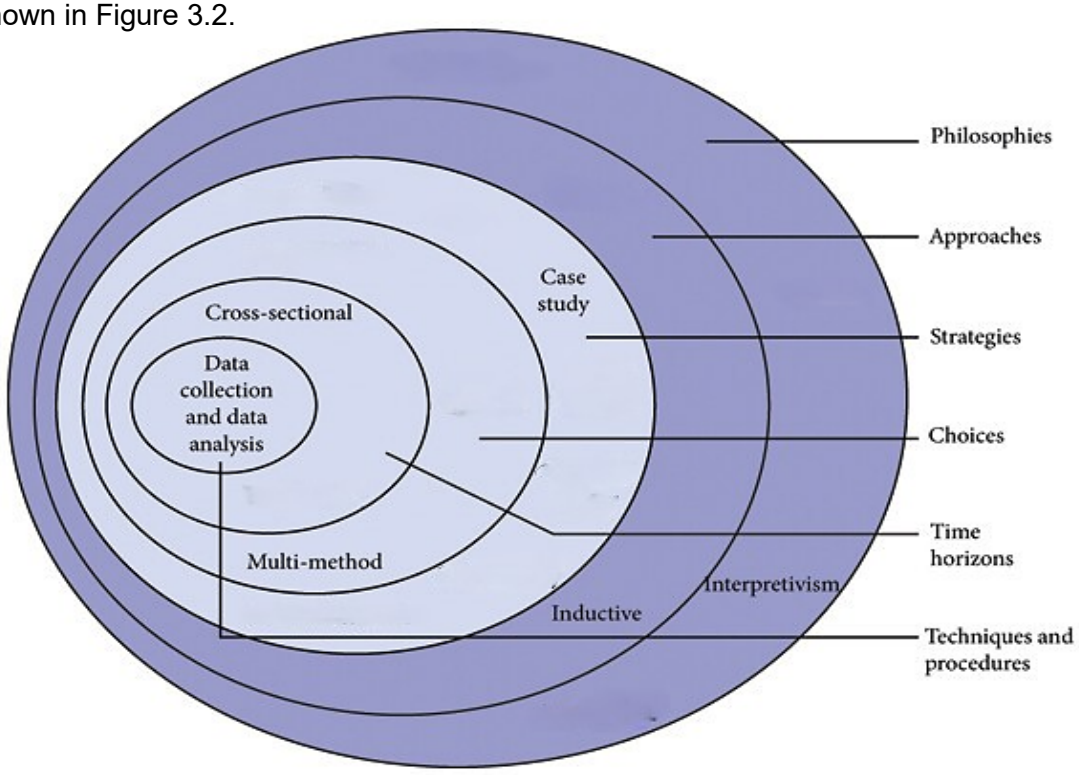


Figure 3.2: Design choices for this research adapted from (Saunders & Tosey, 2012),

3.2 Research Philosophies

Cohen et al. (2017) argue that "An interpretive paradigm rests, in part, on a subjective, interactionist, socially constructed ontology and on an epistemology that recognized multiple realities, agentic behaviours and the importance of understanding a situation through the eyes of the participants". The interpretative paradigm provides a perspective on the world under study for every participant. It is applied with the knowledge that there are no universal truths because everyone has a unique perspective on the universe (Walliman, 2011).

The goal of this study was to ascertain the educators' perceptions of their digital competencies for curriculum delivery in grade 7. Therefore, a key component of this study was the teachers' experiences with technological integration. According to

Reeves and Hedberg (2003), an interpretative paradigm provides context for the phenomenon under study.

As this research is situated within an interpretive paradigm this qualitative research followed a case study design approach. Research philosophy, according to Saunders et al. (2009:107), is connected to the "development of knowledge and the nature of that knowledge." As seen in Figure 3.1, the Research Onion, there are four (4) different research philosophies: positivism, realism, interpretivism, and pragmatics. A researcher's chosen research philosophy is made up of the worldview assumptions that guide the study approach and techniques (Saunders & Tosey, 2012; Saunders et al. 2009:108). Additionally, there are two different perspectives from which research philosophy might be explained: ontological and epistemological (Phair & Warren, 2021:2).

Epistemology is described by Saunders et al. (2009:110–112) as what constitutes acceptable knowledge in a field of study, while ontology is the study of the nature of reality. In their book, they pointed out positivism, realism, interpretivist, and pragmatism as research philosophies. An Interpretive paradigm was applied to this study. The interpretive paradigm is a philosophical framework for research that makes an individual or collective subject to attach subjective meanings to experiences. It stems from qualitative methodologies and allows for seeking an understanding of human behaviour and social events and cultural constructions through the participants' viewpoint. The primary goal of an interpretive paradigm is to understand the subjective realm of human experience (Cohen et al., 2007; 2017). In further detail, Cohen et al.(2007:21) explain that an interpretive research paradigm upholds the idea that truths are contingent upon the context of a given scenario, contrary to the positivist paradigm's contention that there are no absolute truths.

An interpretive paradigm was therefore judged appropriate for this study since it gave the researcher insight into how each participant felt about the integration of digital technology for the delivery of curriculum in Grade 7. A more thorough examination of the TPACK, ICT adoption, and use of ICTs for teaching and learning by participating teachers was made possible by this paradigm. Due to the deeply personal nature of each participant's experience, there is no one reality that applies to all of them; rather, each individual or participant creates their own reality.

3.3 Research approach

The second layer of the Research Onion represents the research approach. It can be either inductive, where a theory is generated as a consequence of data analysis, or

deductive, where a theory and hypothesis are developed together with a research method to test a theory (Saunders et al., 2009:124).

In this study, a qualitative, inductive methodology was applied. The goals of a qualitative research approach are to identify, comprehend, and characterize. Additionally, it allows the researcher to fully immerse themselves in the lives of the subjects they are interested in studying (Pettey et al., 2017:84).

The purpose of this research study was to investigate and ascertain the perception of educators with regards to which educators' technological knowledge and abilities to use technology for teaching and learning have advanced since the WCED's Khanya project was implemented. This will be accomplished by ascertaining the degree and manner in which technology, professional development, technical assistance, and digital resources influenced teachers' utilization of technology for instruction; additionally, it will identify particular elements of professional development that influenced teachers' TPACK development and technology utilization. In order to address the study objectives, the researcher might thus look at how the participating teachers utilize ICTs, their TPACK, and how they incorporate ICTs for teaching and learning into their practices at the chosen research sites by using a qualitative approach.

3.4 Research design and Methodology

A qualitative case study research method was employed in this research. This methodology involved thorough investigation of certain instances, like a particular school or subset of teachers that had efficiently combined digital tools to provide the syllabus in Grade 7. This approach entailed gathering and scrutinizing data via interviews and examining documents. Six participants were selected from two schools in Metro Central district. School A had three participants and school B had three participants who were interviewed in a face to face interview. The interview was recorded and later transcribed to extract the coding needed for analysis.

This study used a qualitative research design since such designs are best suited for the deep probing into experiences, perceptions, and interpretations of the digital competencies by respondents (Creswell & Poth, 2018). Numerical data and generalizability notwithstanding, context and meaning have always taken precedence in qualitative research (Merriam & Tisdell, 2016). This study uses a case study. Case study, as defined by Yin (2018), is an empirical inquiry that investigates a contemporary phenomenon within its real-life context. The case comprises a small assemblage of Grade 7 educators in the Western Cape Province who are symbolic of the digital education forces at play in South Africa. Holistic understanding can best be

attained through the use of the case study methodology because evidence may be collected from more than one source, in this instance, interviews, observations, and reflective journals. The interpretive orientation of the design allows the researcher to co-construct knowledge with and not knowledge about the participants by imposing preconceived categories or assumptions. As Denzin and Lincoln (2018) explain, interpretivist research assumes social constructionism and that reality is subjective and contextual. Thus, individual, institutional, and broader socio-educational forces are seen as framing digital competence perceptions for teachers.

Creswell postulates that an in-depth, comprehensive description and analysis of a single occurrence, phenomenon, or social unit constitutes a qualitative case study. The study entailed comprehensive data collection from many sources, such as observations, reflective journals as well as interviews. The researcher used a range of methodologies to prove the study's authenticity and reliability. A qualitative case study aims to comprehend the subject or instances under investigation in great detail, not to extrapolate conclusions to a wider population." (Creswell, 2014:73)

The researcher collected data using reflective journals as data collection instruments. Data was transcribed and the transcribed data were coded to find themes that addressed the research question.

An interpretivist paradigm was applied to understand how educators perceived digital technology integration in the teaching experience of educators. The interpretivist paradigm, described by Hammersley (2013:52), has its roots in the idea that methods of understanding used in human and social sciences must be different from those of physical sciences. This is due to the difference between humans interpreting and reacting to their surroundings, versus a natural environment that does not exhibit this behaviour.

Rather than adhering to a purely measurement-based approach, Creswell (2007) suggests that interpretivist have a relativist outlook in which one occurrence can have several interpretations. Rather than trying to generalize the fundamental information to the entire population, these researchers will typically try to improve their comprehension of the event and its subtleties within its own particular context.

Drawing on the words of Hammersley (2013) interpretive researchers have an opportunity to understand the world by recognizing and appreciating the perspectives that may exist among different contexts and cultures. This enables them to reduce personal bias when analysing events or people because several perspectives can be generated due to human interaction. Also, this research paradigm permits the researchers not only to describe events or individuals but also to investigate more

profoundly their meaning within a certain social context, thus leading toward an understanding of each topic.

Research can be conducted in a variety of methods; Yin (2009:2) lists case studies, experiments, surveys, economic and epidemiologic research, and more. According to Yin (2009:2) the effectiveness of each of the aforementioned designs varies based on three factors: (i) the nature of the research question; (ii) the degree of control the researcher has over real behavioural events; and (iii) the emphasis on contemporary rather than historical phenomena.

Taking into account the contextual aspects mentioned earlier, the researcher chose to utilize a case study design technique, which is characterized by a case that is investigated over an extended period of time using a variety of data sources (McMillan & Schumacher, 2014; Yin, 2009). According to Yin (2009:18) case studies are empirical research that looks closely at current events in "real-life contexts." A case study is described by Nisbet and Watt (1984:72), as referenced in Cohen et al. (2017:253) as a particular occurrence that is often intended to demonstrate a more general principle. According to Cohen et al. (2017) case studies give researchers the opportunity to see cause and effect in authentic settings, which helps them to understand these "causal links" (Yin, 2009).

Baxter and Jack (2008) conclude that a case study ought to be taken into consideration for the following reasons:

(a) When addressing the "how" and "why" is the primary goal of the research;

(b) When it is impossible to control participant behaviour;

(c) When it is important to include significant contextual circumstances for the phenomenon being studied; and

(d) When it is difficult to draw clear distinctions between the phenomenon and context.

According to Saunders et al. (2009:146), exploratory research frequently employs case study methodology, which may call for a variety of combinations of data gathering methods, including observations, questionnaires, interviews, and document analysis.

3.4.1 Sampling

Purposive sampling is a method in which elements of the sample population are chosen based on specific criteria, meaning that individuals are purposefully selected to be members (du Plooy-Cilliers et al 2021:142).

The list of characteristics used for selection is predetermined and allows for effective participants. The researcher used a non-probability sampling method. Purposive sampling was employed to select the participants in the research. The participants were educators using technology in their curriculum pedagogy. They are in the senior phase i.e. Grade 7 teachers at a primary school. They are using digital technology in curriculum delivery in Grade 7. The participants were able to provide information for the research question on how they integrate digital technology when teaching in Grade 7.

According to du-Plooy-Cilliers et al. (2021:143) the great thing about this technique of sampling is that it ensures all elements within the sample are accurate for the research at hand; each component mirrors the population specifications set out in the study.

Reflective journals are qualitative tools that enable participants to record their thoughts, feelings and experiences during an investigation and valuable in revealing their perceptions and practices. In the process of integration of digital technology, it allows participants to express their experiences reflecting changing attitudes, challenges and milestones. Participants are able to critically evaluate their experiences through reflective writing self-awareness is fostered and growth can be tracked over time. As such it tends to minimize resistance since through it initial fears are addressed and progress recognized a more positive view of the digital tools is attained. Reflective journals promote problem-solving because the participant will identify what barriers are, therefore offering solutions. This increases confidence building in the use of technology. Professional identity consolidation would further consolidate that situation which describes educators as having a continuous learning process. It helps educators reframe the compulsory feeling into an opportunity aspect regarding the development of new competencies through technology integration. For research, reflective journal writing produces rich and authentic data that deeply elaborates the experience of participants, which may later be triangulated with other methods such as interviews and observations. These help provide much better insight into validating the study (Creswell, 2014).

Technological pedagogical and content knowledge is what those Grade 7 educators were applying when they used digital technology in their pedagogy.

The impact of the presence of digital devices on teaching outcomes during lessons assisted with answering the research questions.

3.4.2 Site selection

Two sites were chosen based on their ability to accommodate digital technologies without financial assistance from the Western Cape Education Department (WCED). These former model schools were identified by having a strong infrastructure and

resources, which is the ideal environment for implementing digital tools. Sayed and Kanjee (2013) described such schools as resource-rich environments with an arsenal of up-to-date facilities, access to advanced technology, and well-trained teachers who can provide an example of good teaching and learning practices. They demand high academic achievement from their students and often serve as centres of innovation in delivering curricula and extracurricular activities. Post-apartheid reform also mandated these schools to be fair and inclusive; hence, they had to be racially mixed on the basis of a commitment to unity in diversity. They were anticipated to influence outside their own limits by sharing best practices and providing mentorship to struggling schools around them. This outreach was further bolstered by strategic partnerships with NGOs, businesses, and community stakeholders that supplementary funds and resources realized their exemplary status. Two Quintile 5 schools in the same area of the Western Cape were selected due to their superb digital technology usage in delivering the Grade 7 curriculum. The quintile system is how South African schools fall into categories based on the economic status of the communities they serve. It was a creation of post-apartheid education reform intended to address historical imbalances through equitable resource allocation. Schools in Quintile 5 are not disadvantaged. Compared to the other lower quintiles, it usually sits within good neighbourhoods having a higher socioeconomic level and better access to resources and infrastructure. Consequently, they receive the least amount of government funding per learner because additional resources in fees and private contributions are expected to be generated by them. Quintile 5 Schools are usually situated within urban or suburban areas. They have well-maintained infrastructure; access to technology allowed learning materials are sufficient; however, they enjoy slightly better conditions in terms of learner-to-teacher ratios whereby more individualized attention can be given to learners. The system has its merits; however it creates an imbalance within Quintile 5 schools because the school relies on parental fees. Some parents may not be able to help in the maintenance of the school and hence keeping up with such high standards. These schools usually become reference points when talking about the quality of education, more so when speaking about the integration of digital tools into teaching. Its ability to keep up with sustaining innovation practices that include digital technology in classrooms shows how resourceful environments can change curriculum delivery.

These schools would serve as a benchmark for educators at schools where infrastructure is poor or non-existent and the WCED could act on the perceptions of these educators to make informed decisions about reform when approaching the task of digital technology integration at schools less fortunate.

3.4.3 Participant selection

A method often associated with qualitative studies is purposive sampling to select individuals or sites based on their relevance to the objectives of the study. In this study, two Quintile 5 schools from one district in the Western Cape were selected because they made active use of digital technology in delivering the Grade 7 curriculum. Thus, purposeful sampling enabled the researcher to focus on information-rich cases that would provide insights about the use and impact of technology in education and allow a comprehensive exploration of such an issue (Creswell 2014). Reasons for the choice of these schools are multiple. First, it is because they are making great use of digital tools inside their classes and this falls right within the scope of this study in terms of technology integration. Second, with the choice of two schools, this study would facilitate a comparison between approaches to technology integration within the same quintile which might vary in actual implementation strategies and effects thereof. Their robust infrastructure, characteristic of Quintile 5 institutions, provided an ideal setting to analyse the effectiveness of technology use without the limitations of basic access issues. Additionally, these schools are known to attract well-trained educators, many of whom have received professional development in digital technology, ensuring that the study could explore technology integration from both skill and practice perspectives.

The decision to focus on two schools also ensured feasibility and depth in the research process. This manageable sample size allowed for thorough analysis through observations, interviews, and document reviews without diluting the resources available for the study. By choosing two schools, this study compares strategies for integrating technology within the same quintile, which may be indicative of differences in implementation methods and results achieved. These schools were also examples of better practices through which lessons on effective models of integration could trickle down to less-resourced schools. This study falls under Quintile 5 schools because they are financially independent and have access to private contributions; therefore, it has a special case to see how a resource-rich environment exploits technology in teaching and learning as an instance that can serve as a model for wider education reform.

Three educators in the senior phase (Grade 7) were selected at two schools as both schools only had two Grade 7 classes. The participants selected were class teachers and the other participant was a Physical Education teacher and a Music teacher. The grade 7 learners are able to navigate themselves through technology to achieve desired outcomes hence Grade 7 participants. A Total of six participants were selected for the research purpose. Three grade 7 teachers at each site were selected.

The study was about the educator perception of competencies of educators to use technology for curriculum delivery in Grade 7.

3.4.4. Data collection

Interviews will be conducted with participants to understand their views, opinions, and beliefs regarding the specific phenomenon. To ensure accuracy of data collection techniques such as interviews, notes, past records and audio-visual content should also be used. According to Leedy and Ormrod (2005:135) this is a common technique for qualitative case studies. This method allows for an in-depth analysis of what is being studied giving us more insight into the topic at hand.

The researcher will use standardized open-ended interviews to collect data. This type of interview intends to pose the same questions to all participants in the study, thereby easily facilitating analysis for the researcher. It therefore becomes easier to compare one participant's view with another participant's view (du Plooy-Cilliers et al., 2021:188). The researcher made use of reflective journals which are private diaries in which participants record their perceptions to certain occurrences with an emphasis on both professional and personal development. It promotes the awareness of oneself and ever-continuous learning by critically examining their views and making deductions. Reflective journals have been annotated for helping people come to more conscious understanding of their thoughts and actions in vocational education, academic interaction, and personal growth. Reflective journals help learn who is thinking what about the learning experience and how or why they feel a particular way. Self-Reflection Journals foster the development of self-awareness. Reflective writing as indicated by Boud et al. (1985) encourages an orderly manner of reflection thereby fostering the ability to learn from experience.

In research, observation is a technique used to collect data in which investigators attentively observe participants in controlled or natural settings. The approach may be unstructured (open-ended, without pre-established categories) or structured-with stated criteria or variables. Real-time, realistic behaviour and context can be recorded by the researcher through observation-most of the time yielding very rich in-depth insights that may not be surfaced by surveys or interviews alone.

Much insight and understanding of the social dynamics and environmental forces at play in the moulding of behaviour can be gained through observation. It is particularly valid in the qualitative approach where precision of interpretation demands an understanding of context.

According to Patton (2002) observation gives researchers the ability to vividly depict environments and interactions, which gives the results more nuance and significance.

3.4.4.1 Interviews

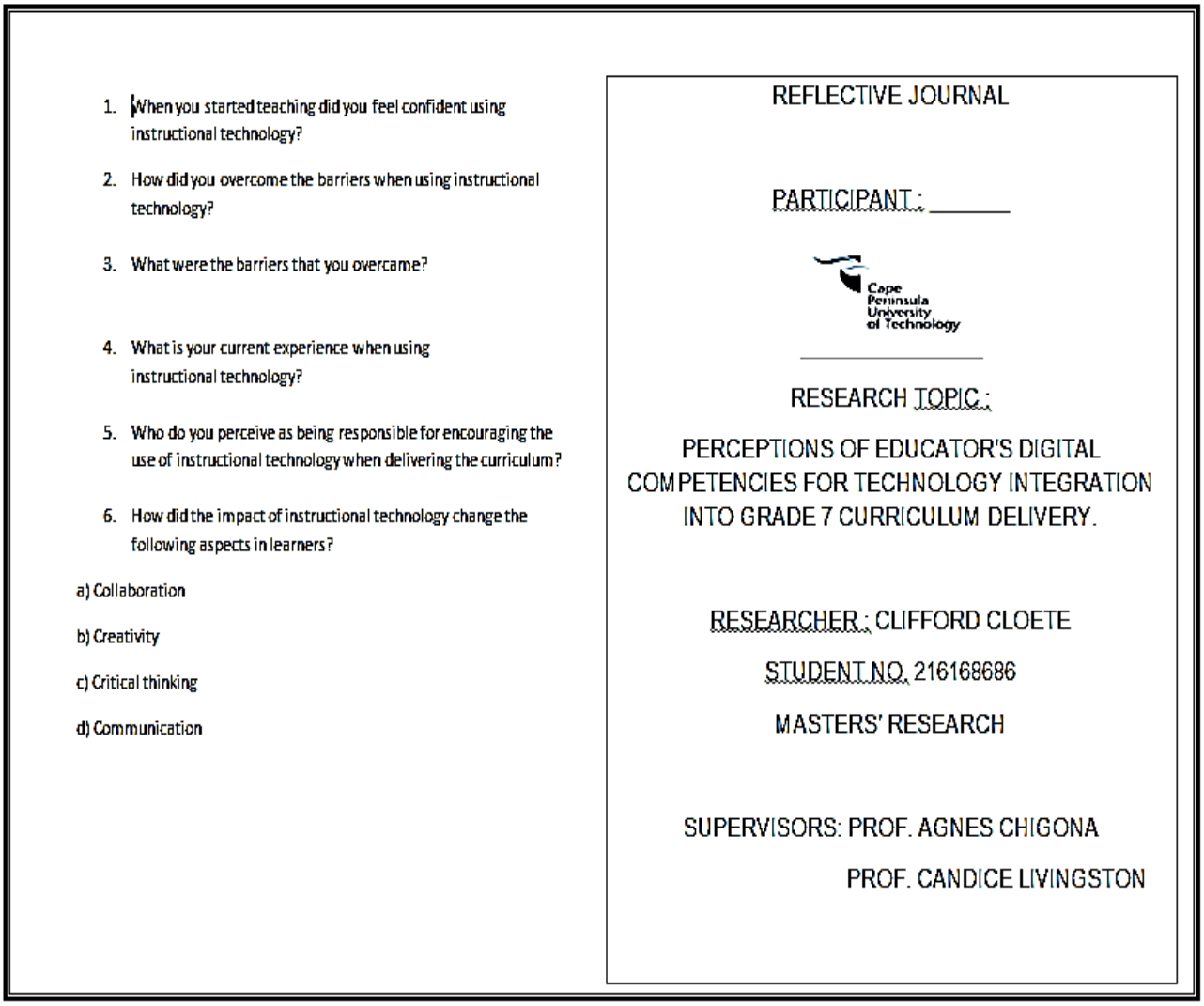
Powell and Single (1996) argued that open-ended interviews are a type of qualitative research methodology which allows for the interviewee to freely answer questions using their own words, as opposed to predetermined response categories or options.

In open-ended interviews, participants can give a more thorough response than what is possible in closed-ended questions. As a result of this, researchers are able to gain access to deeper and more descriptive data that does not necessarily show up through traditional methods (Powell & Single, 1996).

The interviews took place in a setting and at a time convenient for the participants. As Walliman (2011) puts it, there are different settings for conducting interviews which can be within the workplace, at home, or even outdoors. Creswell (2009) asserted that interviews may be individual in-depth exploratory semi-structured or unstructured. The major reason for selecting a semi-structured interview by the researcher is that it permits probing and gives time to extend responses. The teachers talked about the problems of technology, pedagogy, and content they faced when using technology in teaching plus their general views about digital tech use in class during information-gathering interviews with the researcher.

The researcher observed and documented participant responses during interviews. The researcher did not speak until after the participants had finished expressing themselves completely or until the researcher felt compelled to inquire further. Notes were taken and interviews recorded with the consent of the participants. Permission to conduct these interviews and observations was obtained from the university's ethics committee, WCED, the principal, and the teachers. All of the participants were interviewed by the researcher on challenges experienced in introducing digital technology in their classroom practices. It took about thirty minutes for each to complete. They were digitally recorded and later transcribed verbatim.

3.4.4.2 Reflective Journal



1. When you started teaching did you feel confident using instructional technology?
2. How did you overcome the barriers when using instructional technology?
3. What were the barriers that you overcame?
4. What is your current experience when using instructional technology?
5. Who do you perceive as being responsible for encouraging the use of instructional technology when delivering the curriculum?
6. How did the impact of instructional technology change the following aspects in learners?

a) Collaboration

b) Creativity

c) Critical thinking

d) Communication

REFLECTIVE JOURNAL

PARTICIPANT : _____

Cape Peninsula University of Technology

RESEARCH TOPIC :

PERCEPTIONS OF EDUCATOR'S DIGITAL COMPETENCIES FOR TECHNOLOGY INTEGRATION INTO GRADE 7 CURRICULUM DELIVERY.

RESEARCHER : CLIFFORD CLOETE

STUDENT NO. 216168686

MASTERS' RESEARCH

SUPERVISORS: PROF. AGNES CHIGONA

PROF. CANDICE LIVINGSTON

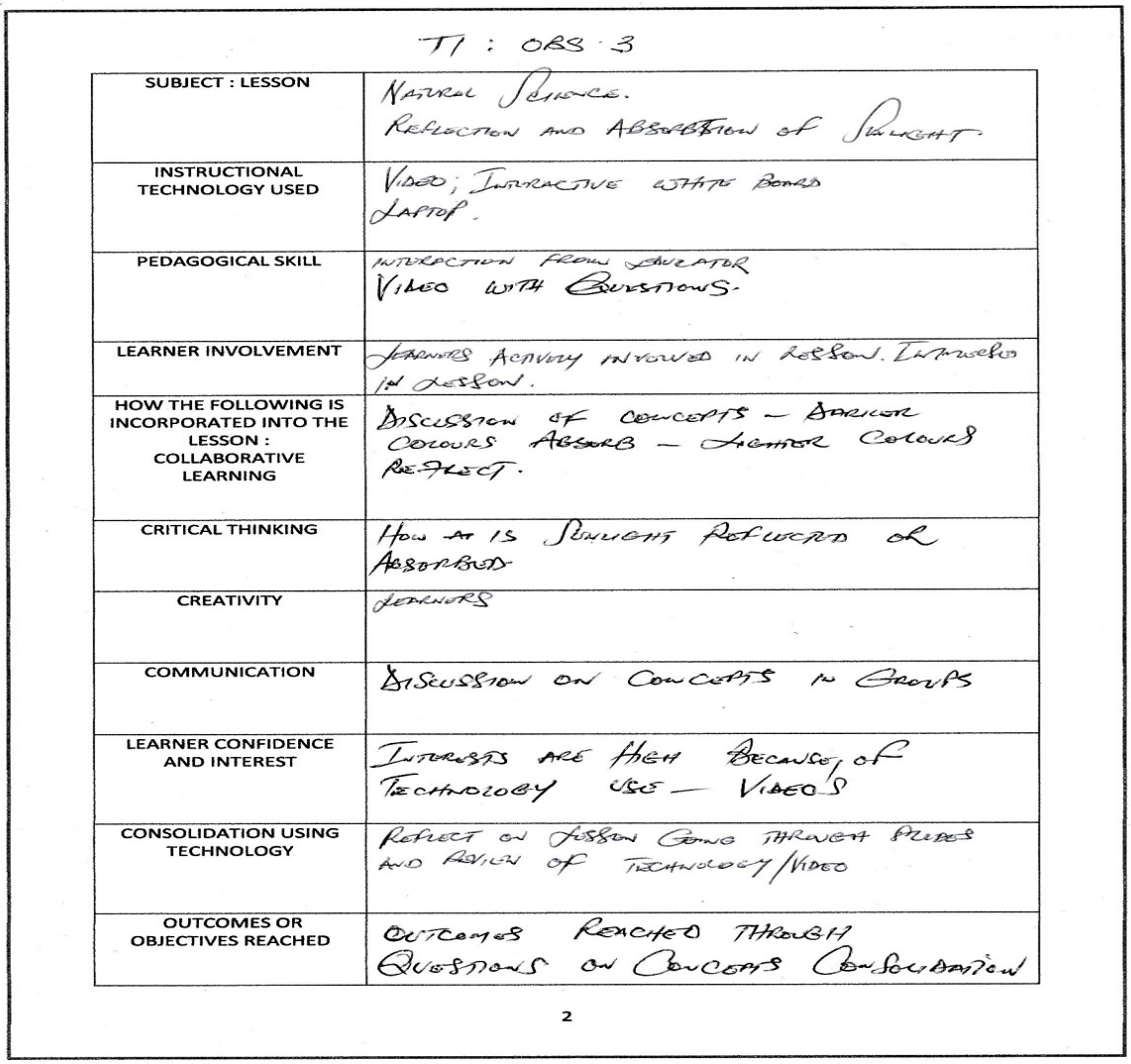
Figure 3.3: Reflective journal

Reflective Journals (Figure 3.3) refers to a written documentation of personal and reflective experiences. It is essentially the product that has been critically thought about and analyzed. In educational settings and professional development, reflective journals are usually prescribed to elicit critical thinking and self-awareness among individuals. As per Moon (2006) it's known to be an effective tool which in turn promotes self-reflective thinking leading eventually towards making oneself more conscious of who they really are; hence, it fosters personal as well as professional development. Thus each individual used this journal in recording and critically appraising every presumption, choice, experience, and action undertaken during their data gathering exercise. This will create a data rich journal by participants without any form of bias. The six participants maintained an intensive reflective journal during both the process of data gathering and research. Reflective journals enhance the validity of data collection since they provide actual, minute, and richly contextual insights directly from those involved. With thoughts, feelings, and experiences recorded at the time of their

occurrence, a true picture is presented regarding how participants relate to the phenomenon under study; it reduces the effect of bias that may emanate from a researcher and enhances authenticity in data.

Reflective journaling was longitudinal in that it captures change over time how attitudes and behaviours develop; it has temporal depth. It also helps to reduce recall bias because the participants are writing about events close to when they happened. This therefore results in more accurate and reliable data than retrospective methods would have achieved. Reflective journals helped triangulate with other sources of data like interviews and observations which therefore led to more credibility and fuller findings. Reflective writing therefore encouraged critical self-assessment in which participants discovered some of their implicit biases and spoke more sophisticated views, thereby enhancing the quality of data and providing a complete description of the context of the study (Boud et al., 1985). The contextual richness captured in journals helped the researcher gain a better understanding of external factors influencing participant experiences because it added depth and credibility to their analysis (Merriam & Tisdell, 2016). Such granular and continuously developing understandings make a substantial contribution to the credibility of the research findings. After transcribing the data the researcher extracted codes for analysis.

3.4.4.3 Observation



T1 : OBS 3

SUBJECT : LESSON	NATURAL SCIENCE. REFLECTION AND ABSORPTION of SUNLIGHT.
INSTRUCTIONAL TECHNOLOGY USED	VIDEO; INTERACTIVE WHITE BOARD LAPTOP.
PEDAGOGICAL SKILL	INTERACTION FROM EDUCATOR VIDEO WITH QUESTIONS.
LEARNER INVOLVEMENT	LEARNERS ACTIVELY INVOLVED IN LESSON. INTRIGUED IN LESSON.
HOW THE FOLLOWING IS INCORPORATED INTO THE LESSON : COLLABORATIVE LEARNING	DISCUSSION OF CONCEPTS — DARKER COLOURS ABSORB — LIGHTER COLOURS REFLECT.
CRITICAL THINKING	HOW AM IS SUNLIGHT REFLECTED OR ABSORBED
CREATIVITY	LEARNERS
COMMUNICATION	DISCUSSION ON CONCEPTS IN GROUPS
LEARNER CONFIDENCE AND INTEREST	INTERESTS ARE HIGH BECAUSE of TECHNOLOGY USE — VIDEOS
CONSOLIDATION USING TECHNOLOGY	REFLECT ON LESSON GOING THROUGH RULES AND REVIEW OF TECHNOLOGY/VIDEO
OUTCOMES OR OBJECTIVES REACHED	OUTCOMES REACHED THROUGH QUESTIONS ON CONCEPTS CONSOLIDATION

2

Figure 3.4: Observation

Observations (Figure 3.4) collects views by noting, both spoken and unspoken signs that show people's thoughts, emotions and actions in normal environments. By looking at body language, facial expressions, and movements, researchers can guess how participants think about certain events, like their comfort or interest in digital tools. Also, watching how people use technology, materials, or work with others shows their thoughts on its value, simplicity of use, and effect on their work.

Patterns of behaviour e.g. constant usage of a certain tool or reluctance to embrace a new methodology give more explicit details about the attitudes of the participants. The environmental context also shapes perceptions since it unveils external factors that may be influencing behavior such as available resources or institutional support. Moreover, observation enables the researcher to pick implicit attitudes which may not be verbally expressed thus offering a more holistic understanding of perceptions. When

applied together with interviews or reflective journaling, this method assists in triangulating data hence making it more valid and deep (Creswell, 2014; Merriam & Tisdell, 2016).

Direct observation of students, by a non-participant, while they use digital devices, such as tablets, for instruction. A researcher can approach the topic of study more closely while still maintaining the role of an outsider or visitor by using direct non-participating observation (Kostera,2007)

The researcher observed the instructional procedure from the side-lines. The observation was discreet and covert. The collection of data and the research process was documented on an observation sheet.

To avoid influencing what happened in the classroom, the researcher made the decision to observe without taking part. He desired a peaceful delivery of the lesson. Because the data was gathered via a non-participative observer, events were occurring as they would on any given day, preventing bias. In order to determine the qualities that are pertinent to the investigation and address the research questions, persistent observations were employed. Additionally, traits that are not pertinent are identified in order to remove them from further analysis.

Through observations, the researcher was able to see first-hand how digital technology is being integrated by teachers. The researcher looked at how educators used different forms of technology in the classroom. Only when a teacher used technology to give a lesson or when they determined that the subject they were teaching required technological integration were observations conducted (TPK). Interviews were therefore the main method used to acquire data. To find out whether or not the teachers actually had TPACK and how it influenced their pedagogy and technology integration, lessons were observed as well. It is through observation that the researcher will be able to note directly from them the problems they face when implementing technology in their lessons. The study also observed how different tools were applied by educators.

3.5. Data Analysis

Textual analysis will be employed to assess text. Priori codes, also termed preconditioned signs, will be created before inspecting the data. These themes will then be connected with the theoretical framework.

Qualitative content analysis, as described by Zhang and Wildemuth (2009), is a process striving to identify unique themes related to some phenomenon rather not tally how often it occurs. The researchers used induction to thoughtfully choose the themes

or categories that emerged from the data, which also suggests that innovations result from constant comparison and detailed scrutiny. Thus reliable interpretation and logical conclusions can then be drawn from the raw data.

Zhang and Wildemuth (2009:309-311) suggest eight steps of qualitative content analysis as a method. The process begins with preparing the raw data into written text, followed by determining which coding unit to analyse (e.g. individual words, phrases, sentences or paragraphs). Next is creating categories and assigning them labels relating to the research topic. This is then tested on a sample text for clarity and consistency of category definitions. The researcher conduct selective coding to determine core codes for further interpretation based on all relevant factors, preventing misinterpretations. Once this has been conducted, the analyst assesses his own coding consistency before drawing conclusions from coded data gathered so far. Lastly, methods were reported as completely and truthfully as possible when it comes time to publish results.

The study used inductive thematic analysis and was based on the six steps of the process as described by Braun and Clarke (2021). The data has been familiarized with transcription and reading it several times. Codes have been generated to identify meaningful segments related to educators' competencies and perceptions. Themes have begun to be discovered by grouping related codes. Reviewing themes involves two levels: level one for coded data extracts, and level two in relation to the entire dataset that they accurately represent the meanings evident in the data as a whole; and ensuring internal coherence while being distinctive. Theme definition is based on theoretical alignment (TPACK) and empirical relevance. Data organization was facilitated by using Atlas.ti software, permitting systematic coding and retrieval. Reflexivity was maintained that is, awareness of the influence that interpretation can have and control over such effect (Finlay, 2021). Themes were cross-checked with the TPACK framework against which educators perceived the interplay between technological, pedagogical, and content knowledge in their teaching practices.

3.6 Coding Process

The researcher made use of qualitative content analysis software to support his analysis.

The participant interviews were taped and then transcribed. To make sure the transcribing process was precise and error-free; the researcher read the transcripts several times over. The researcher was also able to gain a deeper insight of each participant's experience by going back and reviewing the transcriptions. Data analysis needs to be done with consideration for the study's objectives and research challenge

(Walliman, 2011). According to Walliman (2011) the type of analytical method that needs to be used will depend on the nature of the research problem. There was a qualitative analysis—more precisely, coding—used. According to Walliman (2011) coding is the process of creating taxonomies and typologies from large amounts of data (transcripts or notes) by spotting discrepancies in the data, which creates subgroups within the main category.

The researcher coded the data once it had been gathered and transcribed. The study of the qualitative data was conducted using an inductive methodology. A scientific technique called induction encourages people to draw inferences from their daily experiences (Walliman, 2011). The figure 3.5 is an example of a coding table used for analysis.

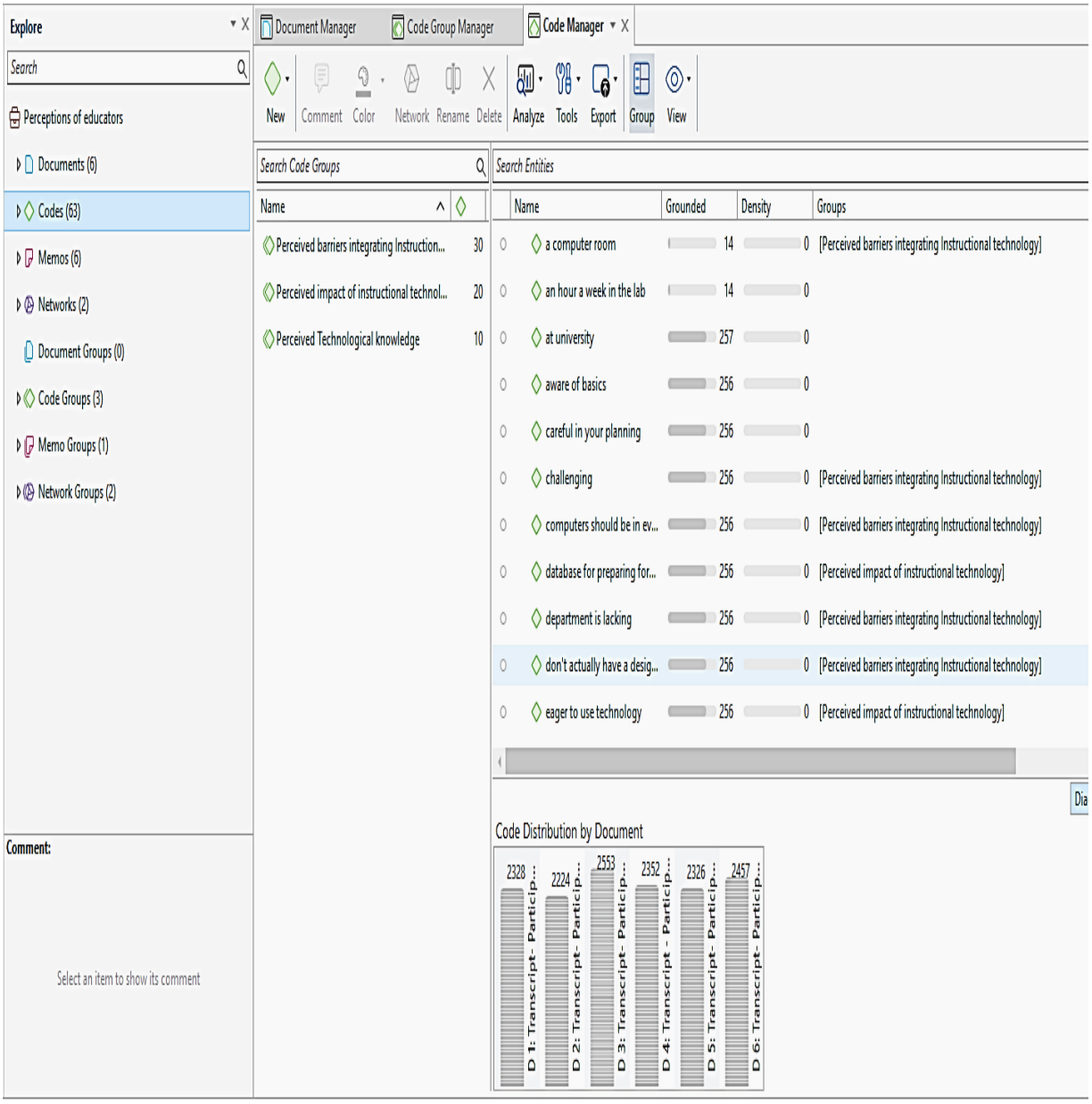


Figure 3.5 Coding by AtlasTI

According to Creswell (2014) the inductive approach begins with the researcher collecting data from the participants. The collected data is then organized into themes and expanded into broad patterns, which are compared to prior research on the subject or the researcher's own experiences. After that, the researcher decided to use the inductive method to develop themes based on the information gathered.

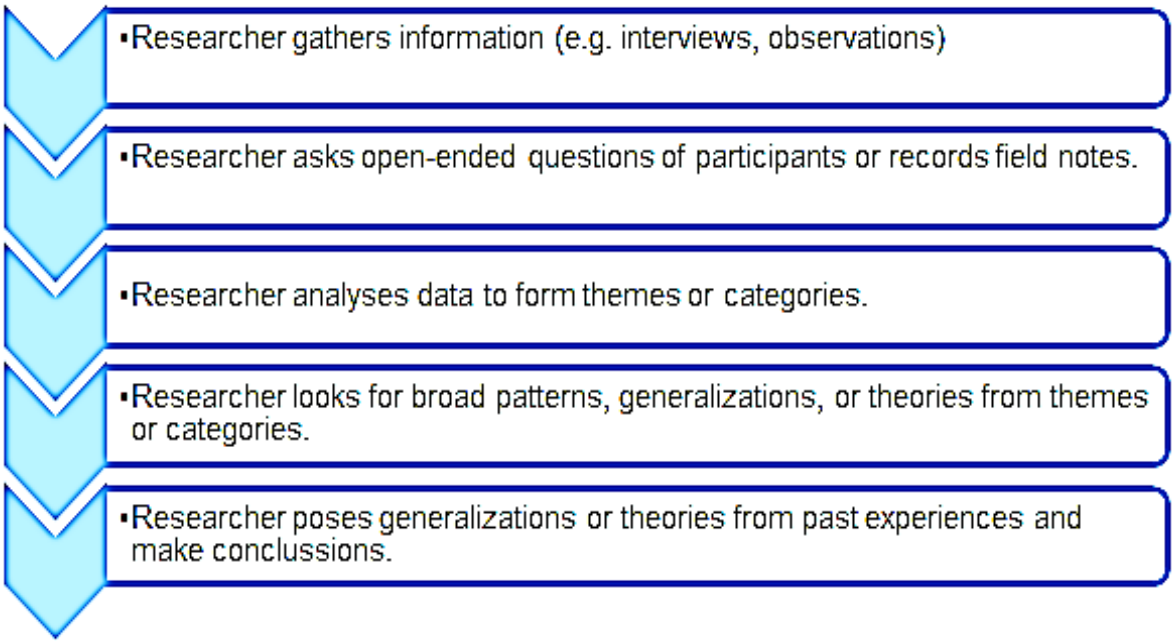


Figure 3.6: Inductive reasoning in qualitative studies adapted source: American Journal of Evaluation, 27(2), pp. 237–246.

Inductive reasoning (Figure 3.6) in qualitative studies involves deriving generalizations and theories from specific observations or data points. This approach begins with descriptive observations that are related to specific contexts and through a careful analysis of the data, patterns and themes are identified that eventually lead to general conclusions or theories. While deductive reasoning works within the ambit of testing already formed theories, inductive reasoning gives an open exploratory way in which the research process and conclusions develop from the data itself. Useful in qualitative research it helps facilitate new theories and understanding springing from actual experience, perception, and behaviour of participants (Patton, 2002; Creswell, 2014). Inductive reasoning also allows researchers multiple viewpoints in understanding complex phenomena if they come without any preconceived assumptions allowing for a much richer interpretation and discovery(Guba & Lincoln,1989).This flexible, data-driven approach is central to methods like grounded theory, phenomenology, and ethnography, where the emphasis is on generating theories directly from participants' lived experiences (Charmaz, 2014).

3.7 Trustworthiness

In academic research, trustworthiness refers to the quality, rigor, and credibility of qualitative research. It serves as a parallel to validity and reliability in quantitative studies and ensures that the findings of a study are accurate, dependable, and meaningful within their context.

The researcher followed the guidelines set out by Krefting (1991) (Figure 3.6) to ensure trustworthiness.

The researcher used three data collection instruments namely interviews; reflective journals and observations to collect data from the participants. The participants were allowed to examine the interview data. Participants consented to the interview questions, observations and questions posed in the reflective journal. Transparency with regards to what was being observed was explained to the participants. The interviews were recorded and later transcribed. The researcher revisited the sites to validate the transcripts from each participant.

Credibility	Using many data sources and data gathering techniques; member verification; and letting participants examine the interview data.
Applicability	Utilizing member checking, interpreting data in line with study aims, and letting participants examine the interview data.
Consistency	Ensuring constant adherence to data collecting procedures; providing thorough explanations to the participants, data collection techniques, and analytic approaches.
Neutrality	Guaranteeing non-intervention. Recording as accurately as you can, asking follow-up questions as needed.

Figure 3.6: Trustworthiness adapted (Krefting, 1991:125).

The researcher employed member checking in an effort to determine reliability. Member checking is the process by which the researcher returns the themes or the completed report to the participants to find out if they believe the results are correct (Creswell, 2014). In order to ensure that the transcribed words are authentic and that

the researcher did not alter or add any information, member checking was employed. Triangulation of data was also done. This is how the researcher developed themes by combining data from other data sources, such as observations and interviews, thereby giving the study more validity (Creswell, 2014).

The reflective journals were transcribed and coded. The data was verified by the participants when the researcher revisited the sites. . Credibility guarantees that the researcher will ensure that the data gathered reflects the participant's own opinions on the study topic. According to Schurink et al. (2011), reliability is the assurance by the researcher that the study procedure is sound and audited. Dependability is the ability to produce results that would remain unchanged if the study were to be conducted again with the same participants and in the same setting.

This study followed Lincoln and Guba's (1985) trustworthiness criteria in their effort to make findings more credible, transferable, dependable, and confirmable:

Credibility: Data triangulation and prolonged engagement were used. Member checking ensured by which the participants checked and verified the accuracy of transcription as well as interpretation (Nowell et al., 2017).

Transferability is ensured by providing thick, contextual descriptions of school settings and relating the experiences of participants so that readers can make their own judgments about how results apply to similar contexts.

Dependability is ensured by transparent reporting concerning an audit trail on data collection, coding, and analytic decisions.

Confirmability is ensured through reflexivity and peer debriefing that serves to check bias carried by the researcher in imposing her or his assumptions on the data rather than assumptions (Finlay, 2021).

By carefully using these strategies, the study keeps its methods strong and stays ethical too.

3.8 Ethical consideration

Ethical integrity formed the nucleus of this study. Therefore, approval was sought from the Ethics Review Committee of the University on one hand, and from the Western Cape Education Department together with relevant school principals on the other hand. The following principles guided the ethical process:

The ethical process was guided by the following principles: Informed consent articulated by participants after detailing information about the aim of the study, procedures, and option to withdraw as well as voluntary participation. (BERA, 2018).

Names were changed, and all information was kept in secure storage with access limited to specific individuals.

Every effort was expended to ensure that no psychological, social, or professional harm accrues as a result of participation.

The keeping of a reflective journal by the researcher shall assist in surfacing bias as well as provide a means of accountability in the interpretive process (Finlay, 2021). Such steps go hand in hand with set ethical standards for qualitative educational research (Cohen et al 2018; Creswell & Poth, 2018).

3.9 The researchers position

The researcher as outsider: There was no relation between the researcher and the schools where the data was collected and this resulted in an absence of bias towards any theme or active search for evidence to bolster these themes. The researcher took extra care to avoid guiding individuals in any one direction. Everyone was free to speak, and every word was captured exactly. The researcher did not attempt to steer participants in any particular path. In this sense, the researcher evaluated the gathered data exactly as it was provided and was not swayed by any prejudice in doing so. Also, not naming the schools made people comfortable to talk openly, which helped in getting true data. At the end, participants got proper information saying their taking part in the study was totally by choice and that they could decide not to join or leave anytime.

Participant engagement in the reliability and validation exercises can also contribute to making sure that subjectivity and bias are balanced. All interview transcripts and any other personal communication between the researcher and participants were allowed for verification by the participants. Besides, all the transcribed interviews were reviewed and reread, and a detailed check of the transcripts was carried out by this researcher's supervisor and co-supervisor to ensure that no information would be left out or input erroneously; all the participants were at liberty to correct any mistakes that might have occurred.

3.10 Chapter summary

The research techniques and methodology of the study on the difficulties they faced incorporating digital technology in their classrooms have been covered in this chapter. The procedures used in the data collection and analysis have been made clear by the researcher. The data instruments that were selected and their rationale have been explained.

There was justification given for the case study design, and a qualitative research methodology was used. Additionally, three (3) qualitative data collection approaches (semi-structured interviews, observations and reflective journal document analysis) were used in this research project, which adopted a multi-method qualitative approach.

Additionally, this chapter has covered a wide range of pertinent ideas, such as validity and triangulation. This chapter also looked at the ethical problems and the researcher's actions to comply with the moral requirements of legitimate study. The researcher starts the process of analysing and interpreting the data in the following chapter after presenting the data from the various data sources.

CHAPTER 4

ANALYSIS OF FINDINGS

4.1 Introduction

This chapter integrates and analyses qualitative data that were collected in response to the major and other study questions: How do educators perceive their digital competencies for integrating digital technology into Grade 7 curriculum delivery? It thus presents three articulated accounts based on three partially structured interviews, reflective journals, and classroom observations triangulated around teachers' perceived competence and barriers toward integration, effects of professional development, and pedagogical adaptation for technology use. Data from six informants-three from each of two schools-will here be presented An analysis describing the qualitative phase and elicitation procedure will be followed by integrated thematic analysis supported by evidence of illustrative participant data. This study examines how teachers perceive their ability to use technology in their pedagogy when teaching the Grade 7 curriculum. The research findings as they surfaced from the classroom observations, reflective journals, and one-on-one interviews are presented in this chapter. Triangulations and a comprehensive knowledge of the facts under investigation are provided to the researcher by the utilization of three instruments. The learned material is presented in this chapter in a logical and orderly fashion.

The interviews gave the researcher an insight into the perception of educator use of digital technology and the challenges faced when integrating technology into their pedagogy. The reflective journal gave the researcher confirmation of the challenges the educators faced and how they mitigated these challenges when integrating technology. The observations showed levels of competencies and in some cases, confirmation of challenges mentioned in the interviews and reflective journals.

Three participants from each of the two schools, agreed to take part in the study. Pseudonyms were used to refer to the six participants who in turn guarantee anonymity. Presented herein are the findings of various data sources placed under themes and sub-themes uncovered through thematic data analysis.

The following key questions guided this study:

What are the perceptions of educator digital competence for the integration of digitale technology in pedagogy in Grade 7?

Sub-questions

S1. What are educator's perceptions of their competencies to integrate

technologies into their pedagogy when teaching in Grade 7?

S2. What do teachers perceive as the competencies necessary to integrate digital technology when delivering the curriculum in Grade 7?

S3. What do teachers perceive as technology integration barriers when delivering the curriculum in Grade 7?

The chapter will be divided into the following:

4.2. Data analysis

4.2.1 The qualitative phase: design and rationale

4.2.2 Participant selection

Perceived Competence in Technology Integration.

4.3. Challenges in Curriculum Delivery

4.4. Impact of Professional Development

4.5. Adapting Pedagogy for Technology Use

4.2. Data analysis

4.2.1 The qualitative phase: design and rationale

The qualitative phase sought to generate thick descriptions that would explain not only what teachers perceived but why and how those perceptions translated into classroom practice. Semi-structured interviews elicited narrative data regarding beliefs and experiences; reflective journals provided data on continuing reflections as well as examples of practice; and classroom observation records described enacted behaviour in response to constraints of context. These complementary sources have been deliberately chosen so as to allow for triangulation and thus enhance the trustworthiness of the findings.

4.2.2 Participant selection

Six teachers who teach Grade 7 were willing to participate in the research. The participants have been purposively selected as practicing teachers with different years of experience and resource availability from two schools in the Western Cape. Pseudonyms have been used, to maintain confidentiality i.e., Participant 1 – Participant 6. The selection criteria for participants were:

(a) must be teaching Grade 7,

(b) willingness to participate in the interview and keep a reflective journal, and

(c) willingness to be observed at least once in the classroom.

Such purposive selections enabled the study to gain perspectives that ranged from novice to experienced teachers and included different access levels to labs/devices, which are relevant to the research questions.

4.2.3 Data collection procedures

4.2.3.1 Semi-Structured Interviews:

The main source of data was semi-structured, individual, face-to-face interviews. Each interview was audio recorded with the permission of the respondents and lasted approximately 40–70 minutes based on an interview schedule guided by the subsidiary questions of the study. The questions were based on and elicited information regarding participants' perceived digital competence; specific examples of technology usage in Grade 7 lessons; skills that they feel are required to effectively integrate technology; and barriers encountered in curriculum implementation. Therefore these can be under the following representative probes: "What is your feeling about using digital technology in the classroom?", "Which technological, pedagogical or content skills do you believe are necessary to integrate technology in Grade 7 lessons?" and "What challenges do you face when using technology to deliver the curriculum?". The semi-structured interviews unearthed some very strong sentiments which will further flesh out emerging themes, for instance,

"I'm not opposed to it but I haven't engaged with it… The only way you're going to see if it's going to work is if you actually implement it".

4.2.3.1 Reflective journals:

Participants kept reflective journals over time. The journals were set up as low-stakes private spaces where teachers wrote about classroom tries, challenges, changes, and thoughts on professional learning. Prompts asked for reflections on lessons with tech use lately feelings of skill, experiences of professional development, and ideas for future practice. These entries matched and added to interview data — for example, journals noted step-by-step confidence gains (Participant 1: *training at university was helpful*; Participant 5: "*at first we had one computer in the staffroom… regular use built my confidence"*).

4.3.3.2 Observation:

Three participants were seen performing a Grade 7 lesson that either contained planned or unplanned opportunistic use of technology. The study was a nonparticipant observation using a checklist drawn against the dimensions of TPACK: visible use of technology, pedagogical routines enabled by the tool, alignment to content objectives,

learner engagement, and contingency when there is a breakdown in the usage of technology. Successful integration (e.g., simulation use, student collaboration) and constraints (connectivity failure, and lack of devices) were recorded in the observations as lessons learned. For example, OBS 1 recorded connectivity confidence in using simulation software for electric circuits while OBS 2 used projected equipment and had to turn to textbooks when it failed.

4.3 Data management and analysis

4.3.1 Transcription and data preparation

Interview recordings were transcribed verbatim. Reflective journal entries with observation notes were collated, then digitized, having identifying details redacted and replaced with pseudonyms included in the coded extracts saved to an audit trail for transparency together with the thematic maps. Data were interpreted through Inductive thematic analysis (Braun & Clarke, 2006). The researcher read and reread the transcripts, journal entries, and observation notes to get familiar with the data set. Open coding at first identified both semantic and latent codes relating to competence, barriers, professional development, and pedagogical change. These codes were then collated into broader themes that mapped onto the main research questions of this study: Perceived competence; Challenges in curriculum delivery; Impact of professional development; Adapting pedagogy for technology use. The qualitative software package Atlas.ti was used to code and organize text segments (see Figure 3.5 screenshot). Theme validity was strengthened by triangulation across all three datasets: where interviews spoke to reluctance or confidence this was checked or complicated by journals and observations (e.g., interview claim of “I’m all for [digital technology]” (Participant 5) backed up in a journal entry specifying attempts to include interactive games). Merged Themes from interviews, journals, and observations have been presented. Summary statements are first given, and then supported by Triangulated data with interpretative comments that explicitly relate the finding to a component or components of the TPACK framework and the literature.

4.3.2 Merged thematic findings (triangulated))

Theme 1 — How People View Their Skill in Using Technology Across sources, teachers described moderate technical competence but limited pedagogical application. Interviews revealed that many teachers considered themselves “functional users” (Participant 2: *“Novice teachers…are eager to use technology. There’s no fear there…experienced teachers…are a bit sceptical*”), journals recorded progressive confidence built through practice and self-study, and observations showed varied enactment — from high-quality simulation-based lessons (OBS 1) to substitutional uses

such as PowerPoint or video (OBS 3). Together these data indicate strong TK in several participants, but weaker TPK/TCK and incomplete integration into content-rich pedagogies.

Theme 2 — Challenges in delivering the curriculum include things like infrastructure issues, lack of resources, and time constraints. All three data sources converge on systemic barriers: limited devices, crowded labs, unreliable connectivity and lack of on-site technical support (Participant 1: *“we have about 15 machines and we are 702 learners”*). The observations made the impact of these issues visible (OBS 2: equipment failure leading to reversion to textbook teaching). The journals also recorded the time burden and planning pressures that undermine teachers’ willingness to experiment.

Theme 3 centres on how professional development and peer support make a difference. Workshops do not make much difference in the long run. Participant 3 said, *“We had training… once or twice… thereafter never again.”*

However, peer support and local leadership were evident in OBS 1 and OBS 3 where teaching was more effective that was observed in classrooms. Participant 3 assumed the role of an “IT champion” while Participant 4 had an innovation committee. Therefore, continuous, school-based, and collaborative professional development would work better for developing TPACK than standalone technical training. Participant 6 noted that where teachers achieved deeper integration, there was improved student engagement. Other participants supported this by saying,

"When students see themselves recorded or get immediate feedback....it increases engagement."

Journals indicated a change from the earlier dominant lecture mode to more interactive activities while observations noted group work and continuous assessment made possible by the technology. The adaptations were, however, uneven and heavily dependent on resources and also on the confidence of the teacher.

Trustworthiness was heightened through methodological triangulation (interviews + journals + observations), long engagement with participant data, use of word-for-word quotes, and round-and-round member reflection (participants reviewed summaries of their transcripts or journal excerpts where feasible). The use of qualitative software backed clear data handling.

Transferability: A detailed description of the school contexts, participant backgrounds, and classroom conditions will provide sufficient information to judge by the readers on transferability to other Grade 7 settings in South Africa.

An audit trail comprising raw transcripts, coding memos, thematic maps, and observation checklists was kept. Reflective notes were also maintained. Peer debriefing with the supervisors (Prof. A. Chigona and Prof. C. Livingston) ensured external scrutiny of analytic decisions.

Reflexivity Positionality and potential biases were noted in reflective memos by the researcher (see Chapter 3); where feasible, steps could be taken to mitigate confirmation bias by way of triangulation and an audit trail.

4.4 Perceived Competence in Technology Integration.

Perceived Competence in Technology integration highlights the teacher confidence and integration capabilities using technology. Educators who perceive themselves as having high competence are eager to experiment using digital technology in delivering the curriculum, while those who view themselves as having low competence may avoid or find it difficult to use digital technology in delivering the curriculum.

The following figure 10 is a graphic illustration of the perceived competence in technology integration.

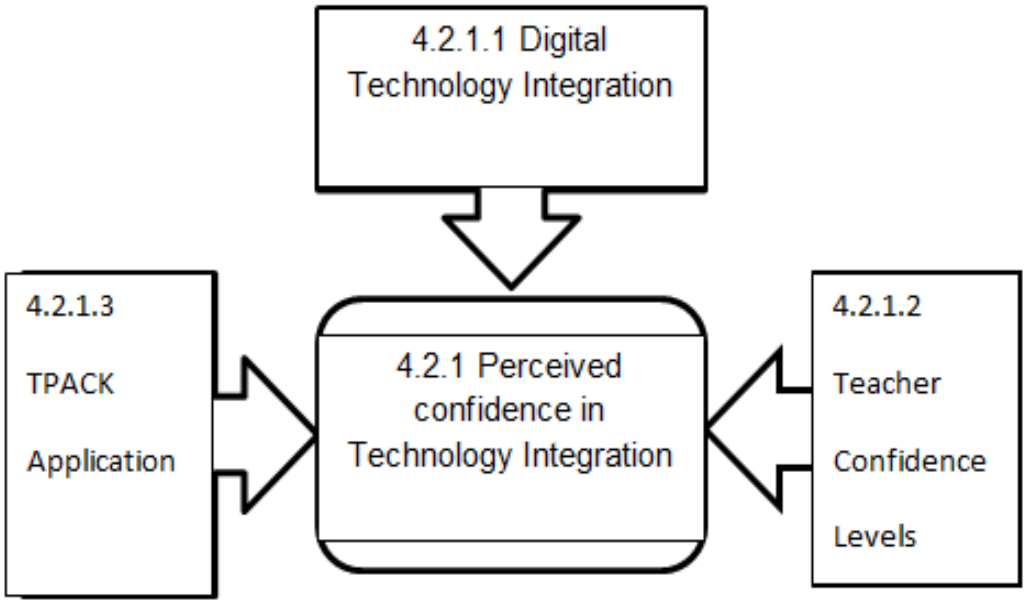


Figure 4.1: Perceived confidences in Technology integration

4.4.1 Digital Technology Integration

Data taken from the reflective journal and interviews, plus some observations, gave insight into digital technology integration at the places I went to. To find out how digital technology integration was viewed, this question was asked all participants: What is your feeling about the use of digital technology in the classroom? From the data collected some concerns came up about using digital devices (smartphones) in the

classroom.The participants express reservations about the use of digital technology in the classroom. Here is what some participants had to say:

Participant 4*: "I'm not opposed to it but I haven't engaged with it... The only way you're going to see if it's going to work is if you actually implement it"*

Participant 5: *"I'm all for [digital technology]. I think a lot of planning and preparation needs to go into making that possible because learners...catch on all kinds of things with their digital phones"*

Participants embraced the need to change but had concerns about the integration of the devices into curriculum delivery.

Participant 6: *"I think [digital technology] has to be managed...kids aren't mature enough to bring their own devices in class and use it"*

A factor that differentiates modern civilization is the ubiquity of digital cell phones, they are now major implements of daily life management, communication, and acquisition of information. Digital devices are within easy reach of educators and learners and are used in the daily delivery of the curriculum or used to make information available to the learners in their care. Digital phones transcend place and time and learning can take place whenever and where ever it is needed in our modern society.

Margot and Kettler (2019) also noted that “the uniqueness of digital learning is represented by the fact that students are not tied to specific places and time, since training materials are always available to students, access to it is always available, this allows students to get used to the idea that training always happens and everywhere, in any convenient place”

Naidoo and Kopung (2020) claim that digital apps like WhatsApp are being utilized more frequently in classrooms to encourage peer interaction, immediate feedback, and cooperative learning, enhancing accessibility and collaboration in the learning process. Due to the lack of digital technology use and the lack of educational guidelines when delivering the curriculum in Grade 7, educators are reluctant to use digital technology as a means of delivering the curriculum. It would be wise to suggest specific applications to involve the learners through interactive programs for example Mathematics online curriculum (MCO) to deliver the curriculum in other subjects. The progress of the learner can be monitored, be it at school or at home.

4.4.2 Teacher confidence levels

A major theme that came across the interviews was an appraisal of digital competence by the educators. While most participants expressed confidence in using basic digital tools, fewer embraced comfort with advanced integration which transforms pedagogy.

Participant 3: "I use PowerPoint, WhatsApp, sometimes Kahoot, but when it gets to interactive lessons or digital assessments, I do not know what to do."

This brings forth the exact dimension that Redecker (2023) described as a 'technical comfort zone.' Teachers have acquired good technical skills but are not equipped with appropriate pedagogical frameworks in order to apply technology meaningfully. We've had workshops, but they mostly show us how to use the device not how to use it to teach better. These perceptions fall within the Technological Knowledge (TK) dimension of the TPACK model and indicate little overlap with Pedagogical Knowledge (PK) or Content Knowledge (CK). Koehler et al. (2013) argue that genuine digital competence can only be fostered in the interplay between these domains, enabling teachers to dynamically align technology with immediate learning objectives. This theme implies that though the training initiatives by the WCED have succeeded in improving technical skills, there is a gap in pedagogical transfer. This reflects what has been found by Tunjera and Chigona (2020) as well as Nyathi and Joseph (2024).

Bandura (1997) posits that teacher confidence levels refer to educators' self-perceived abilities to successfully discharge their duties and responsibilities. These include delivering curriculum content, managing classroom situations, and applying any new tools or methods such as digital technology into teaching. The confidence levels are influenced by professional training, previous experience, support from the institution and other resources available. When confidence levels are high, teachers can take challenges with resilience in building new teaching practices that also have a positive effect on student results. In the course of the interviews, participants were asked this question: What technological knowledge do you think is needed by educators to implement digital technology into their pedagogy?

The participants expressed a positive attitude towards integrating digital technology into their pedagogy but noted that experienced teachers were often scared of technology.

Participant 3: *"A lot of the teachers are feeling very confused and... the support is not always provided which results in... resistance and hesitation"*

The perception is that younger or novice teachers are more adaptable and confident in implementing technology into their lesson presentation and pedagogy.

Participant 2*: "Novice teachers...are eager to use technology. There's no fear there...experienced teachers...are a bit skeptical"*

Those who consider themselves low in technological competence may feel anxious or apprehensive; however, those who view themselves as highly competent in the area feel confident using gadgets, software, and digital systems. It has been observed that novice teachers are considered to show much high confidence while integrating technology into the delivery of curriculum content, whereas experienced teachers are seen as hesitant.According to Ertmer and Ottenbreit-Leftwich (2013) rather than implementing significant changes in student outcomes and classroom activities, the majority of teachers use ICT largely as tools to help convey curriculum. According to their description, students most frequently use ICT for learning to prepare written assignments and do information searches online. They blamed the issue on educational institutions and systems for emphasizing technology when pedagogy is the real answer. According to them, the objective should be to change the topic of discussion to technology-enabled learning so that using technology to learn is prioritized over ICT integration as a stand-alone objective.

The confidence levels can be perceived as an indicator of the level of training and professional development with regards to technology integration into curriculum delivery.

Participant 3: *"We had training... and I think the training sessions. Once or twice... thereafter never again... "*

Participant three was of the opinion that not enough training was provided to encourage the integration of digital technology into Grade 7 curriculum delivery. The lack of training has a negative effect on their perception of their ability to use digital technology when delivering the curriculum in Grade 7.

4.4.3 Integrating TPACK into Teaching

TPACK assists educators in considering how to incorporate technology into their teaching in a meaningful way as opposed to just adding it on. It encourages the development of curricula and instructional practices using a holistic approach by taking into account the dynamic interactions among the three knowledge domains namely knowing how to use different technology tools, gadgets, and software, such as computers, tablets, interactive whiteboards, and educational apps, is known as technological knowledge (TK).
Pedagogical Knowledge (PK) is the comprehending teaching strategies, approaches, and practices that facilitate learning, lesson planning and management of a classroom as well as student engagement. Content Knowledge (CK): The mastery of the specific

content being taught, such as science, math, or language. TPACK provides a form of professional growth that instructors can utilize to become more comfortable and successful in tech-enhanced learning environments based on continuous change in the domain of educational technologies.

With the growing importance of digital tools in education in the twenty-first century, this approach is helpful for directing educators.

With the rising role of digital tools in education in the 21st century, this method is relevant to guide teachers. Positive views about the use of digital technology in classrooms by participants' responses to this interview question: What technological skills for teachers do you think are required to integrate digital technology into their teaching?

Participant 4: "*Software designed for the classroom. For instance, Google Classroom... allows the student and the teacher to engage directly but also indirectly*"

Participant 6: "*Technology shouldn't be just about replacing what you can do with pen and paper. It should be about creating something new or doing something different"*.

Participant 5: *"Technology is very much a part of our lives, and so I think it's a brilliant idea to bring these things into education"*

Most participants observed, opted for using the technology as an ad-on to their lesson by the way of PowerPoint presentation, word processing, internet, overhead projection as well as Google classroom. Projects were typed and handed out as photocopies. The objective as stated by participant 6 was seldom about "creating something new or something different" but just replacing the blackboard with technology.

According to Chigona (2015) pedagogy can be transformed by the incorporation of digital technology. It is believed that new methods of accessing and processing information are made possible by digital technology. It was evident that participants had limited training in actually applying the TPACK framework in presenting the pedagogy when delivering the curriculum in Grade 7.

The researcher's observations made it clear that many teachers have strong pedagogical content knowledge in addition to their pedagogical expertise. However, because digital technology was just being used as a replacement for the conventional chalkboard, there was a lack of technological subject understanding when it came to integrating technology. It was observed that having technological skills by themselves does not ensure that a teacher can use digital technology to educate effectively. A teacher needs to acquire the following kinds of knowledge, which were covered in greater detail in Chapter 2, in order to use digital technology in the classroom

successfully and efficiently. Technological knowledge (TK), content knowledge (CK), and pedagogical knowledge (PK) are the three categories of knowledge. A teacher must possess the three knowledge categories listed above and be able to apply them effectively and efficiently as a single unit in order to integrate and employ digital technology.

4.2. Challenges in curriculum delivery

The following figure 4.2 is a graphic illustration of the challenges in curriculum delivery.

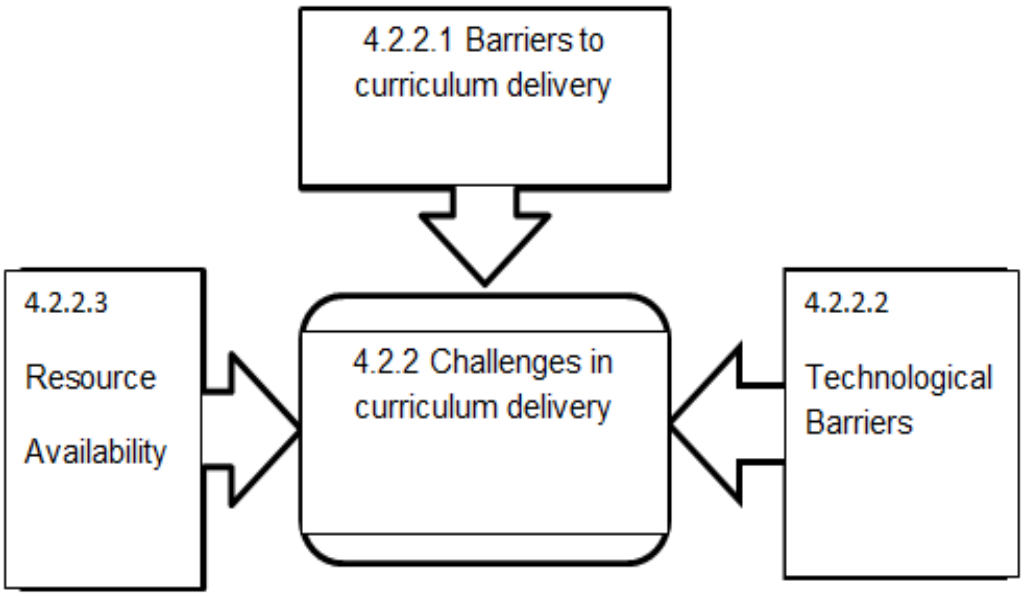


Figure 4.2: Challenges in curriculum delivery

4.2.1 Barriers to curriculum delivery

It becomes very challenging for the instructors to instill a program that fits every learner, due to the wide variations in abilities learning styles and backgrounds that the learners showcase. Insufficient materials, equipment, or teachers in schools makes it very difficult to implement the curriculum properly. Quality and scope of education delivered is often compromised by pressure on teachers to complete the syllabi within the stipulated time. Inadequately professionally developed teachers may find it challenging to incorporate digital technology into the revised curriculum.

The participants expressed concerns about the availability of the computer lab and the number of learners that could be accommodated.

Participant 1: *"We are quite limited... we have a computer room and our kids can't always get access to it... it does limit us to actually use it effectively"*

The perceptions of participants regarding the attitudes of teachers when using technology in their pedagogy were varied. Participants felt that the novice teachers were more open to the use of technology when delivering the curriculum. Participant 5 was of the opinion that *"Novice teachers are very eager to use technology...experienced teachers...are a bit sceptical"*

Participants perceived experienced teachers as reluctant to embrace technology when delivering the curriculum in grade 7.

Participant 6: *"It takes a lot of getting used to, so [experienced teachers] don't necessarily think of different ways of using technology"*

The lack of professional training was perceived as a huge barrier to integrating technology when delivering the curriculum in grade 7. Participants felt that it was not adequate for the purpose of delivering the curriculum and thus participants had a reluctance to integrate digital technology due to lack of application skills.

Participant 3: *"We had training... and I think the training sessions. Once or twice... thereafter never again... a lot of resistance"*

As was previously mentioned, some teachers are not integrating digital technology into their curriculum delivery even after obtaining training on its use. According to Chigona and Chigona (2010), who examined ICT integration in the Western Cape, there is literature supporting this trend. Despite having received training through the Khanya initiative, they observed that a small number of teachers were not using digital technology in their classrooms. It was noted that teachers were still hesitant to use digital technology in the classroom because, according to them, the training provided was not adequate. Basing on the earlier stated facts, participants of this study also articulated that more training is required for them to effectively implement digital technology in their classrooms.

4.2.2. Technological barriers

All participants spoke of infrastructural and resource inequities as great barriers toward digital integration. There is a paucity of readily available functional devices accompanied by some variations in support for stable internet connectivity, including technical support, to sustain the use of technologies continuously.

Participant 2 :"The Wi-Fi keeps dropping, and sometimes the projector doesn't work. You end up wasting half the lesson trying to fix things."

These constraints echo the findings at the national level by Isaacs (2020) and Chomunorwa et al. (2025) who postulate that in South Africa, resource imbalances

continue to perpetuate a 'two-tier digital education system.' Besides physical barriers, large class sizes, socio-economic imbalances between students, and student digital literacy made integration less easy.

Participant 4: "Some learners don't even have phones at home so when I give online tasks only half can complete them."

This digital divide puts into play the Contextual Knowledge, XK, dimension of the extended TPACK model (Mishra, 2019), since effective technology integration depends on contexts and is deeply rooted in contexts. Other systemic barriers include time and curriculum rigidity. Teachers expressed a battle between aligning innovation with standardized assessment requirements thus supporting the claim by Ertmer and Ottenbreit-Leftwich (2019) that external policy structures inhibit pedagogical flexibility.

The equipment and surroundings that make it possible to integrate digital technology are referred to as infrastructure. Poor infrastructure was identified by Voogt and Tondeur (2015) as a deterrent to teachers in less affluent locations integrating digital technology.
Inadequate infrastructure can involve a bad WIFI connection, a lack of computers or IT support, a lack of projectors or a lack of electricity. Regarding the infrastructure obstacles they faced when attempting to include digital technology for curriculum delivery, teachers shared the following perspectives.

Participant 6 noted that "at our school there is never an IT guy"

Participant 3 as the designated "computer champion" said that "I was the one that. Just like stepped up and thought, OK, let's just share and teach where we can because we don't actually have a designated IT person at the school, which I think is a big lack and causes a lot of resistance"

Both participants were pointing out the ineffective IT management at school with regards to hardware and software support for the computers they had at school. According to Chigona and Chigona (2010), they found that teachers who were expected to use digital technology lacked the technical assistance they needed to successfully integrate the technology. They discovered that when teachers required technical assistance, the experts would arrive at their own pace, leaving them waiting for extended periods of time.

4.2.3 Resource availability

Lack of resources or Internet access, inadequate funding and intermittent power outages and inadequate network coverage are some of the concerns participants had with integration of technology. The main concern was the lack of computers for the population of the school where only a fraction of the school could be accommodated in the computer lab.

Participant 1: "So we've got about 15 machines and we are 702 learners so it does limit us to actually use it effectively"

Participant 5: "We would like to improve by purchasing tablets for the Grade 7s and then moving down...but at the moment it's just a discussion"

Participant 6: "You can't have all the devices in one space...move the devices from the lab into the classroom, even if it's just six per class"

Participants had a concern about the use of technology eg. Digital phones provided by the learners as they felt that the control issues were not fully explored yet.

Participant 2: "It's difficult to monitor students when they are using their own devices like digital phones"

Stols et al. (2015) found that the reason teachers were not incorporating digital technology for pedagogy was because it took time to connect the technological equipment every morning, time taken away from the lesson in progress. Besides, a common issue among teachers was a lack of time. Thus, many educators believe that using digital technology will consume time that they already do not have. It negatively affects the teachers' views on the integration of digital technology in the classroom. The role of digital technology is supposed to reduce the time taken to deliver the content. It was observed that in larger groups, people tend to feel lost and will be first hesitant to ask questions. When teachers find that using digital technology is taking up too much time, they revert to using chalk and talk methods of delivering the content.

4.3 Impact of Professional development

4.3.1 Professional development needs

Professional development is the term used to describe organized educational opportunities that improve professionals' abilities, expertise, and efficacy in their particular domains. Professional development for educators aims at helping teachers master educational tools, widen their scope of subject matter knowledge, and refine their pedagogical skills so that they can cause better student outcomes. This continuous learning process which may include workshops, seminars, mentoring, and

collaborative learning helps make teachers fit in any novelty or change concerning their profession. The perceptions of participants highlighted the lack of professional development and the absence of official education on the appropriate integration of instructional technologies for pedagogy at universities or teacher training institutions. It underpins the lack of continuous workshops that can be conducted in schools to educate teachers on the different types of digital technology and to demonstrate to them how to successfully incorporate technology into their pedagogy. One recurring theme that emerged from the interviews was the teachers' inadequate training on integrating and using technology. Due to their lack of training, many teachers lacked the confidence necessary to use digital technology into their lessons. Hayes (2005) concurs with the aforementioned assertion regarding the significance of training and asserts that principals ought to assist teachers seeking ways to integrate technology into delivering the curriculum.

Participant 3 had the following views on professional training *"We had training... and I think the training sessions was once or twice... thereafter never again... a lot of resistance"*

"When we are provided with resources there's not sufficient ongoing training which creates a very big resistance"

Participant 2 was of the opinion that the workshop group were too large and the knowledge transferred got lost during the workshop.

“So now this 245 people in the workshops… But I'm also not hearing you because you've lost me because the focus group is too big.”

Participant I was of the view: *So basically for me personally I studied and with us we did library sciences back then and that's where we got introduced to technology. And I think the department is lacking in the sense of really equipping our teachers with the correct tools when it comes to using technology within our classroom setup and with our daily lessons. A lot of schools are not aware there are many platforms that we can use to implement technology where we link our curriculum and the delivering of the curriculum with technology. So a lot of us self-educate ourselves with these new technologies and platforms that we can use to deliver curriculum using the latest technology.*

Many of the participants stressed the need for smaller workshop groups so as to involve more of them and better understanding. They wanted more hands-on workshops that would get them to touch and use the technology rather than just sit through lectures. Participants also mentioned continued help and training as important, hence suggesting that workshops should be made for all levels of skill and comfort with

the technology. Not having received proper professional training to integrate digital technology into teaching practices has resulted in low confidence in the use and integration of such technology. This underscores hardly any effort on the part of trainers to ensure similar action on the part of instructors for curriculum delivery.

Chigona (2015) found in her research that as a result of inadequate preparation throughout their teacher education, recently qualified educators were not incorporating digital technology. Teachers may use digital technology in the classroom with confidence once they understand how to integrate technology into their pedagogy. Teachers who lack technological expertise will be unable to integrate and use digital technology for curriculum delivery in an efficient manner. To successfully integrate several types of digital technology, technical competence is essential. The likelihood of integration is increased when teachers possess a high degree of technical expertise. Their high levels of confidence when utilizing instructional technologies are the driving force behind this. One element that influences the incorporation of digital technology is teacher self-efficacy (Tondeur et al., 2008).

The likelihood that a teacher will use digital technology increases with their level of comfort with it. According to Buabeng-Andoh (2012) the incorporation of digital technology is significantly influenced by instructors' self-efficacy. Leendertz (2013) claim that one of the main obstacles to integrating digital technology in classrooms, is a lack of confidence. Thus, increasing instructors' self-confidence will make educators more eager and interested in using digital technology to deliver the curriculum. According to Chigona (2015) who concurs with the aforementioned, teacher efficacy affects whether or not they include digital technology into their lessons. She goes on to say that teachers' technological efficacy is influenced by their efficacy. Chigona came to the conclusion that a teacher's instruction would be impacted and their self-efficacy to integrate technology would be low if they were never educated to use it.

Some teachers are not using digital technology in their curriculum delivery, as was deduced from the data, even though they have received training on how to use it. According to Chigona and Chigona (2010) who examined ICT integration in the Western Cape, there is literature that supports this trend. Even after getting trained through the Khanya initiative, they saw only a few teachers using digital technology in their classrooms. They added that teacher’s still feels queasy about using digital technology in the classroom, a clear sign that the training they received was not enough. By saying that they believed they needed more training to successfully integrate digital technology into their classroom, respondents of the survey reaffirmed these claims.

4.3.2. Peer Support Systems

Peer support systems are fundamental to integrating digital technology as it enables teachers to work collaboratively, share information, and build trust. In such a comforting environment, teachers can collaboratively troubleshoot issues, share best practices, and progressivement develop confidence in using technology in their classrooms. Researchers found that teachers' skills to integrate technology into their teaching practices could be greatly improved with peer support and more so if such support is coupled with professional development. For example, the studies by Leech et al. (2022) give emphasis to how much collaborative support available among educators can make a difference in in-tech adoption and implementation. For teachers who had never used digital technology before, support systems for integration have to take an urgent priority. Teachers' ability to integrate digital technology for pedagogy despite their lack of prior training demonstrated the importance of such structures. However, it has to be noted that, before deciding to learn how to use digital technology into curriculum delivery, teachers first had to see the advantages it offered. It shows how important a teacher's mindset is in the decision to use technology. It therefore suggests that teachers will go through all the processes required to achieve this if they desire digital technology. Support networks are critical for teachers. Providing these teachers with any form of support would help dispel all the anxieties she has regarding the use of digital technology. Also, having a setup that lets you count on skilled people to help when there is a problem is very important and would encourage more teachers to use digital technology. Because of this, schools needs to have a rule about using digital technology and a plan ready for any problems that teachers might face. Digital technology will be readily embraced by teachers for use in the classroom as long as support is provided to them. Peer support networks help in the development of skills with information sharing, coping strategies, and problem-solving methods. One component, described by Solomon (2004) of peer support that builds self-efficacy by showing how people can be actively involved both in their own being and decisions made about them. Peer support systems open learning and developmental windows professionally and educationally because support is based on experience.

4.4. Pedagogical adaptation for technological use

Classroom practices varied by subject area, resource availability and personal confidence. Participant 1 was a Natural Sciences teacher who described the integration of videos and simulations. This goes hand in hand with the Content Knowledge (CK) and Technological Content Knowledge (TCK) intersections of TPACK, where digital tools aid conceptual understanding (Mishra & Koehler, 2006).

On the other hand, Participant 5, a Mathematics teacher said that even though technology was available, lesson planning time and curriculum pressure restricted its usage: This speaks to the fundamental disconnect between policy optimism and classroom reality (Selwyn, 2019). In practice, educators' pedagogical choices are driven by workload, curriculum demands, and accountability pressures in the system and not by innovation. While digital tools were enabled in all classrooms observed, their use was mainly as delivery mechanisms rather than for active learning or collaboration to which Ngadi (2024) finding resonates whereby most South African teachers are either at the Substitution or Augmentation stages of the SAMR model rather than its transformative use. Adapting pedagogy for technology use means the modification of instructional methods and teaching strategies to appropriately integrate technology into learning environments. This adaptation aims at improving avenues of learning, student engagement, and providing a flexible as well as an interactive mode of learning. In most cases, such an adaptation requires educators to reconsider the conventional practices of teaching so as to effectively exploit digital tools, platforms, and resources in meeting the diverse requirements of students' different learning needs. Through the infusion of technology, teachers can draw greater interest from students inspiring them to take active participation by making the process dynamic and interesting. The SAMR model described how technology can enhance or transform educational processes as per Puentedura (2006). According to this paradigm, students are more likely to participate fully in creative and interactive assignments that connect with their digital lives when teachers modify their instruction for technology.

Participant 4: *"I think we are getting to a point in education where it's no longer teacher at the board delivering the curriculum but more engaged curriculum"*

Participant 6: *"Technology shouldn't just replace worksheets; it should allow students to create something new that they couldn't do otherwise"*

Through online cooperation, sharing tools and thoughts makes a talkative and joint learning happen. It lets the students work well together thus improving their skills in speaking, teaming up, and deep thinking. No matter where they are, students can use chat boards, video calls, and team tools like Google Workspace to link up and work as one.

4.4.1 Student Engagement and enhancement through Technology

Technology-enabled pedagogy grooms students with critical thinking; adaptability; and digital literacy, which are the needs of the modern workforce. Since students increasingly need to access, assess, and produce information in digital contexts, the Partnership for 21st Century Skills (2007) emphasized the competence that should be

taught. That is to say, teachers may help learners acquire skills for successful futures and active citizenship by changing lessons to content with the aid of technology.

Participant 1 said that, "The mere fact that they are using technology just excites them all over."

Participant 2 stated, "Students participate more eagerly if they see that the teacher knows how to use technology. It creates a connection."

Participant 4: "So I would use different sorts of games in order to consolidate what has been taught"

Participant 6: "When students see themselves recorded or get immediate feedback on their performance, it increases engagement"

According to Murcia (2010) educational technology creates a platform for students to engage in conversation and interaction. The intrinsic qualities of digital technology foster communication and interaction, resulting in a teaching environment that is learner-centered. A learner-centered teaching environment makes it possible to create a setting in which students must collaborate throughout group projects, thereby fostering communication and interaction between them. Warwick et al. (2010) further stated that instructional technology provides a medium and an environment which facilitates interaction and knowledge construction by the learners. Learners like learning when they are involved and not just passive recipients of the content. Though this section has highlighted several merits of digital technology, the use of digital technology by teachers continues to be voluntary for the aforementioned reasons of inadequate infrastructure, inadequately trained personnel, and negative perceptions of its role in curriculum delivery. Hence, if we want to see educators using technology for teaching and learning, a number of variables have to be addressed. However, most participants expressed that they were in agreement with the idea that digital technology improves the teaching and learning process and outcomes thereby suggesting that they were aware of the advantages it provides.

4.5 Reflective journal analysis

The following themes were identified through thematic data analysis for Reflective Journals:

4.5.2 Perceived Competence in Technology Integration

4.5.3 Professional development and impact

4.5.4 Challenges in curriculum delivery and adapting pedagogy for technical use

4.5.1 Thematic Findings from Reflective Journals

This section presents three core themes that emerged from the reflective journal data of six participants. These themes explore educators' perceived competence in technology integration, the professional development impact and the challenges faced in adapting pedagogy and delivering the curriculum using digital devices. The findings are supported by participant reflections and situated within relevant academic literature.

4.5.2 Perceived Competence in Technology Integration

Perceived competence means the confidence and ability of educators to appraise them effectively in integrating digital devices into their teaching practice. For most, competence was gained from training or institutional support at the beginning of their career life. This is supported by Tondeur et al. (2017) who indicated that an uplifted spirit regarding the use of digital tools is mostly inspired by initial exposure accompanied by continuous support within professional contexts.

Participant 1 noted, *"Yes, fortunately while studying at UWC, we had a module in library science. This helped me aid my lessons better,"* reflecting how preservice training fostered early confidence. Similarly,

Participant 2 shared, *"Teaching at x Primary allowed me to bring technology into curriculum delivery because of the resources available. I could apply my ICDL skills obtained in 2007."*

However, not all participants started from a place of confidence.

Participant 5 remarked, *"I was definitely not as confident as I am now. Initially, we had one computer in the staffroom for all. Regular use of whiteboards and projectors eventually increased my confidence."* This evolution illustrates how practice, over time, builds familiarity and ease with digital tools.

Participant 3 expressed strong initial competence, stating, *"I have always been confident when using technology in the classroom. It allows for more involvement and interaction from the learners."*

By contrast, Participant 6 recalled, *"In 1997, I had very little knowledge or access. Most of what we did was administrative. Over time, I had to teach myself."*

This in turn proves that with constant interaction with digital devices during curriculum delivery, educator perception might be influenced positively towards the use of instructional technology.

4.5.3 Professional Development Impact

Formal, informal professional development was central to the building of capacity by educators to use digital devices at all levels and in every place. As noted by Lawless and Pellegrino (2007), teacher training is crucial in the integration of technology into teaching practices and should be supported by a sustained culture of learning. Several participants said they went to formal training.

In the words of participant 2, *"In 2008 I did a MISPIL course that the department funded, and also a Mimio Interactive Whiteboard course that I attended." This has borne fruit in better usage of technology within classrooms.* Others relied on self-directed learning and peer support.

Participant 1 said, *“I empowered myself by attending short courses. I also asked colleagues for help. COVID also forced me to overcome some barriers.”*

Similarly, Participant 5 noted, *“I attended workshops and spoke to colleagues who were confident and trained in this area. Our head of IT was always willing to assist.”*

Participant 3 described acting as a professional development facilitator for peers: *“As the school’s IT champion, I had to provide training to staff. They were initially very resistant and it took a lot of convincing.”*

Self-initiative was particularly evident in Participant 6’s response: *“I was self-taught, bought my own devices, and developed a school resource plan with our principal.”*

For Participant 4, professional growth was supported by institutional structures: *“An innovation committee was formed to address technological changes and allowed us to collaborate on what tools to use.”*

The availability of resources and the collaboration amongst peers to empower each other, when using digital devices, play a huge role in fostering the use of technology during curriculum delivery.

4.5.4 Challenges in Curriculum Delivery and Adapting Pedagogy for technical Use

The integration of digital devices into pedagogy was not without its challenges. Common barriers were lack of resources, infrastructural unsteadiness, staff opposition, and aligning technology with the demands of the curriculum. This supports Ertmer (1999) classification of first-order (external) and second-order (internal) barriers and Koehler and Mishra (2009) TPACK framework which also shows the complexity integrated technological, pedagogical, and content knowledge.

A complete lack of preparedness was summed up by Participant 1. As explained: “I was not ready and had not even heard of Google Classroom, but suddenly found myself being taught”, “how to use it.” The adaptiveness had to prevail.

Participant 3 observed the difficulty in changing staff attitudes: *“The biggest challenge was full staff involvement. They were initially very resistant.”* Similarly,

Participant 2 pointed out, *“Using technology should enhance and not consume the lesson. Managing this balance was difficult.”*

Infrastructure issues were common. Participant 4 recounted, *“We invested in solar energy to deal with load-shedding and improved internet speed with more WiFi hubs.”*

Participant 6 also cited, *“Lack of resources, poor internet, and equipment maintenance”* as core challenges.

Participant 5 noted the tension between personal and professional responsibilities: *“Raising a family made it difficult to find time for planning and troubleshooting tech tools.”*

Participant 6 shared, *“I use devices to mirror learners’ work in class and record movement in PE. Technology enhances rather than duplicate textbook learning.”*

While these were challenges, most participants changed their pedagogy to take advantage of the affordances of technology.

4.6 Observation analysis

4.6.1 Perceived Competence in Technology Integration

Educators’ perceived competence with digital devices significantly impacts their implementation of technology-enhanced teaching. According to Ertmer and Ottenbreit-Leftwich (2010) teachers’ beliefs about their capabilities are critical determinants of their willingness to integrate technology effectively. Moreover, confidence often stems from prior experience, access to digital tools, and structured training (Tondeur et al., 2012).

Across the observations, there is a variance in the perceived competence of educators. In OBS 1, the educator skillfully integrates simulation software and standalone computers while confidently managing learners who are using technology independently to complete a project related to electric circuits. This supports Ertmer &d Ottenbreit-Leftwich (2010) assertion that perceived self-efficacy allows for more active integration of technology. OBS 2 sees the educator battling connectivity and faulty hardware, thereby reducing learner engagement. Though PowerPoint was used, there was a great reliance on traditional methods (textbooks) because of the failure of the

technology. This indicates limited competence or confidence to vary lessons immediately when technology fails.

In OBS 3, technology is used effectively with videos and interactive presentations. The educator's comfort with tools like PowerPoint and video prompts student discussion and interest, indicating high perceived competence and a sound understanding of integrating technology into lesson structure.

4.6.2 Curriculum Delivery challenges

Infrastructural challenges, involving internet unreliability, electricity problems, and even issues on the device end are also noted as barriers towards successful technology integration (Pelgrum, 2001). These external factors pose challenges in ensuring an effective content delivery in resource-constrained environments (Buabeng-Andoh, 2012).

OBS 2 is the most explicit about infrastructural challenges where there was electricity as well as projection equipment that was not working which severely affected lesson delivery.

OBS 1 indirectly reveals access issues — a single lab serves over 500 students, indicating that while the teacher is prepared, resource scarcity limits scalability. This echoes Pelgrum's (2001) finding that access remains a major barrier in many educational contexts.

OBS 3, by contrast, benefits from functioning video and PowerPoint tools. However, there is no mention of systemic issues, which may imply either better infrastructure or a smaller class context. The successful delivery underscores how resolved logistical barriers can facilitate curriculum implementation.

4.6.3 Professional Development's effect

Pedagogical and technical know-how support for the integration of digital tools requires professional development to be effective (Desimone, 2009). Greatly increasing the proficiency and enthusiasm of teachers toward educational technologies by training them consistently and making it contextualized to their needs (Lawless & Pellegrino, 2007). Competence inferred in OBS 1 and OBS 3 suggest prior exposure to professional development opportunities. No specific mention of training in any of the observations. The thoughtful integration of simulations and interactive media points to a well-informed pedagogical strategy.

In OBS 2, the lack of adaptive strategies during failure could suggest limited professional training in contingency planning or low exposure to technology-integrated

pedagogy. Lawless and Pellegrino (2007) advocates for ongoing, contextual training that enables educators to remain flexible and resourceful.

4.6.4 Adapting Pedagogy for Technology Use

Conventional pedagogy has to be changed by technology, not just aided. The value of TPACK—Technological Pedagogical Content Knowledge—as a structure for teachers to successfully implement digital resources into their teaching practices is highlighted by (Mishra & Koehler, 2006). Adapted pedagogy encourages innovation, collaboration, and active learning (Laurillard, 2013).

OBS 1 demonstrates the most pedagogical adaptation , the use of simulations and visualizations to support conceptual understanding of electric circuits represents a shift from traditional methods to more constructivist, student-centered learning.

OBS 3 also uses a new teaching method by using video and talks to look at the abstract idea of light reflection. This fits with the TPACK setup where tools, teaching methods, and lessons work well together (Mishra & Koehler, 2006).

Chapter Summary chapter

This chapter examined and described the key elements influencing teachers' use of digital technology as well as their perceptions of educational technology integration. Teachers encountered several obstacles that prevented them from integrating digital technology, even if the advantages it offered to pedagogy were acknowledged. These include low technical efficacy, theft, inadequate training, lack of infrastructure, lack of support, and a lack of support systems in schools. This chapter identified a number of obstacles that prevent instructors from fully utilizing digital technology for pedagogy in the delivery of the grade 7 curriculum, including these and numerous others. In order for the integration of digital technology to be successful plans must be made in order to accomplish the ideal integration of digital technology into pedagogy.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This qualitative study set out to investigate how educators perceived the digital skills they encountered while using digital technology into their teaching and learning processes, as well as how these issues were addressed. The researcher used interviews and observations to get insight into the attitudes of individual teachers on the use of digital technology in pedagogy as well as the motivations behind their decisions. The researcher also looked into the factors that led them to continue using the conventional teaching paradigm as well as the perceptions of educators regarding the implementation of digital technology use during curriculum delivery in grade 7. The outcomes of this study are summarized in this chapter with reference to the literature on digital technology in education and teacher integration of digital technology. This study also examines the relationship between the theoretical framework and the important discoveries. The chapter will conclude with brief summary, future research directions, and the study's limitations.

The major questions that guided this study are: What is educator digital competence for the integration of digital pedagogy in teaching Grade 7? How do educators perceive Technological Pedagogical Content Knowledge as a framework to improve the integration of digital technology while delivering the curriculum in grade 7?

S1. How do educators perceive their competencies to integrate technologies into their pedagogy while teaching in grade 7?

S2. What do teachers perceive as the benefits of using digital technology in their pedagogy when delivering the curriculum in grade 7?

S3. What do teachers perceive as barriers to implementing instructional technology when delivering curriculum in grade 7?

This study effectively achieved its goals, which are outlined below, by using a qualitative approach. Since it remained within the parameters of the study's theoretical framework, a qualitative method was thought to be the most appropriate. Both the goals and the research questions were addressed by employing this approach. The following are the study's objectives, which emanate from the aim of the study are:

- To investigate how teachers perceive the use of digital technology for pedagogy in the delivery of the grade 7 curriculum.

- To comprehend the difficulties teachers encounter while integrating digital technology for pedagogy in their classrooms.
- To offer potential suggestions to overcome difficulties related to the integration of didactic technology.

The remainder of this chapter is divided into the following subsections:

5.2 Overview of the study

5.3 Summary of Findings

5.4 Concluding remarks and suggestions

5.5 The researcher's closing thoughts

5.2 Overview of the study

Chapter 1 outlined that this research study aims to explore and understand the perceptions of educators regarding the integration of technology into grade 7 curriculum delivery. Three objectives were identified to support the main aim. Firstly, to determine to what extent teachers perceived their competencies to integrate technology in their pedagogy when delivering the curriculum in grade 7 and how technology, professional development, technical support, and digital resourcing aspects contributed to teachers' use of technology for teaching and learning. The second objective was to determine what educators perceived as the benefits of using digital technology and highlight specific factors of professional development that contributed to teachers' TPACK development and use of technology. The third objective was to determine what teachers perceived as barriers to implementing digital technology when delivering the curriculum in grade 7.

Chapter 2 In Chapter 2, a thorough literature analysis examining digital technology in South Africa was presented. The Khanya Project, the WCED e-Learning unit, The WCED Game Changer, and the application of the e-Learning Strategy were the main topics of the chapter's additional analysis of digital technology in the Western Cape.

In addition to focusing on both internal and external aspects, the literature outlined the various challenges and strategies impacting the integration of digital technology in our schools and offered prospective solutions that have been proposed in the literature. The chapter also covered the many benefits that digital technology offers when used wisely to provide curriculum delivery. The researcher investigated the difficulties in-service teachers encounter when utilizing technology and perceptions of current use of digital technology in the delivery of curriculum in grade 7. The objective of this research is to furnish suggestions to the WCED, principals, and educators who possess some degree of influence on the use of digital technology in primary schools.

Chapter 3 presented the research techniques and methodology of the study on the difficulties educators faced when incorporating digital technology in their classrooms. The procedures used in the data collection and analysis have been made clear by the researcher. The data instruments that were selected and their rationale have been explained.

There was justification given for the case study design, and a qualitative research methodology was used. Additionally, three (3) qualitative data collection approaches (semi-structured interviews, observations and reflective journal document analysis) were used in this research project, which adopted a multi-method qualitative approach.

Additionally, this chapter has covered a wide range of pertinent ideas, such as validity and triangulation. This chapter also looked at the ethical problems and the researcher's actions to comply with the moral requirements of legitimate study. The researcher starts the process of analysing and interpreting the data in the following chapter after presenting the data from the various data sources.

Chapter 4 This study was conducted at two schools in central district in the Western Capel, and the data collected and analyzed from the six teacher-participants were used to establish empirical findings and to draw conclusions. This chapter identified the following findings: the importance and impact of digital technology integration at schools; the technology provided schools and how it is used; the motivators and barriers to digital technology use; and the technical support provided by WCED and the technology department. Chapter 4 thus identifies and discusses the empirical findings, and

Chapter 5 will discuss the conclusions, recommendations, and limitations of this research study. This chapter connects the major discoveries with the primary and secondary investigative queries to offer a unified examination of how teachers view their digital skills for merging digital tools into the Grade 7 syllabus. Using the Technological Pedagogical Content Knowledge (TPACK) model as a guide, the discussion explains findings in relation to the study’s goals and places them within the South African educational landscape. The results show that though Grade 7 teachers have basic technological literacy, they do not equally translate this knowledge into pedagogy; in other words, they are not as technologically pedagogically literate. Other findings of the study confirm the above by revealing that teachers feel confident about some basic digital operations but are unsure about how these operations and any digital tools can be used to achieve curriculum outcomes. Integration efforts are hampered by resource inequities, limited technical support, and inadequate professional development. This chapter synthesizes the manner in which the questions were answered by drawing barriers between educators’ self-perceived competencies

and professional learning conditions that shape their technological integration. Synthesizing begins to draw a barrier, thereby initiating a path toward answering the main research question of this study: what are the conditions necessary for effective technological integration in classrooms aimed at enhancing pedagogy?

5.3 Summary of findings

The thesis, "Perceptions of Educator's Digital Competencies for Technology Integration into Grade 7 Curriculum Delivery," examines the requirements and difficulties that Western Cape teachers have when integrating technology into their grade 7 classes. Based on the Technological Pedagogical Content Knowledge (TPACK) paradigm, this study examines the variables that affect the efficient use of technology in the classroom. According to key results, teachers in these environments face a number of difficulties, such as a lack of resources, schedule restrictions, poor technical assistance, and restricted training.
In order to obtain information, the study used qualitative techniques, including document analysis, interviews, and observations with six instructors. It demonstrates that complete support systems are necessary for successful technology integration, even in the face of growing use of instructional technologies and e-learning efforts.

The study underscores the importance of developing digital competencies and technological acumen combined with content and pedagogical knowledge, especially in resource-limited schools.

5.3.1 Addressing the Main question

Educators perceive their digital competencies as developing but not in an even way. In the use of digital devices such as tablets, interactive whiteboards, and Google Classroom that would aid instructional delivery, most participants expressed confidence in their abilities. This opened up a gap on the real understanding on ways to integrate technology within pedagogical and content domains. PowerPoint slides, YouTube videos, or online worksheets were presumed to be the real meaning of “technology integration,” not digital tools that could actually transform learning experiences. As one teacher put it:

“I use Google Classroom just to post homework. I don’t know how to use it in making the lessons more interactive.”

This pattern speaks more of technological substitution than it does about pedagogical transformation. Teachers know digital tools but find it difficult to use them effectively for learner-centred activities. Therefore, they consider themselves to be moderately competent-technical ability but with a pedagogical constraint. This finding reverberates

the works of Chai et al. (2013) and Koehler & Mishra (2019) who state that it is not sufficient to be technologically competent for adequate and effective integration. Rather, it is the harmony of TK, PK, and CK in the context of TPACK that prescribes meaningful usage of technology.

5.3.2 Addressing the Sub- Questions

5.3.2.1 Perception of educators' competencies for digital technology integration

This sub-question sought to establish from educators their perceptions of competencies for integrating technology into pedagogy when teaching in Grade 7. Most participants described themselves as 'functional users.' They were able to use technology within the classroom setting. They did not always describe themselves as transformative practitioners. They could use digital platforms for presentations and communications but their lessons do not fruitfully focus on exploration, collaboration, and critical thinking. For example, some teachers used videos to present topics but went back to the traditional method of assessing and allowing students to practice. This finding tallies with observations (Tunjera & Chigona, 2020) that South African pre-service teachers have greater operational competence than pedagogical fluency. It denotes that most educators are at the TPK and TCK stages rather than getting to the integrative balance of TPACK. The professional development focused more on the operation of the device and navigating through software rather than using technology to support curriculum delivery, classroom management, and learner engagement.

The perception of educator competencies for integrating digital technology for pedagogy in grade 7 was the main focus of this theme. The purpose of the study was to ascertain if, either during their teacher preparation program or at their present or prior jobs, educators had experience using digital technology in the classroom. It was also noted in the results that educators' decision to use digital technology to present the curriculum was greatly influenced by their level of instructional technological proficiency. The results indicate that the older instructors did not receive training in the use of digital technology for pedagogy during their teacher preparation. This was because computer technology use in the classroom was still relatively new. As a result, they did not graduate having encountered computers or any other educational technology. The majority of these educators were only recently introduced to digital technology as it began to permeate the educational landscape. Thus, these educators had to acquaint themselves with digital technologies as part of their lessons. Some educators hesitated to embrace the new idea because they had not been utilizing instructional technology in their teaching methods for quite some time, even if they recognized the academic benefits this technology could provide. While the Khanya

initiative started training teachers in digital technology, results appeared to indicate that the sessions lacked both depth and relevance to specific subjects. As a result, many educators felt insecure about their ability to employ educational technology. Many still believed they required additional instruction. The perception was that younger educators were more receptive to employing digital technology because they had been trained on how to utilize the technological equipment during teacher training, A broad spectrum of issues, including but not limited to inadequate technical assistance, availability of devices, maintenance, and subject specific software, influenced the integration of digital technology.

According to the observations made, not every participant was able to incorporate digital technology in a way that demonstrated the teachers' mastery of all seven TPACK frameworks constructs. These teachers may have possessed pedagogical content knowledge, but their technological proficiency was woefully lacking in relation to the instructional outcomes of the twenty-first century. Many teachers were found to be lacking in technological knowledge, technological pedagogical knowledge, technological content knowledge, and TPACK, and participants had limited experience in digital technology. Therefore, professional development on technology use and integration is necessary to have effective educators that possess TPACK.

The factors that contribute to educators' reluctance in the use of digital technology are more than confidence but also training and resources. The provision of adequate resources will give them the confidence to implement digital technology into their teaching practices within the classroom. There is a need for regular training of teachers to provide training for those who have never used digital technology.

The second sub-question asked about the skills teachers think they need to successfully put digital technology into their Grade 7 lessons.

Teachers shared three main skills:

Technological fluency: - the ability to use, fix, and adjust to changing digital tools.

Pedagogical design is the ability to select resources that enable student engagement and assessment.

Digital activities have to be aligned with the goals of Curriculum and Assessment Policy Statement (CAPS), this can be referred to as curriculum alignment.

For example, mathematics educators noted that there is a need for training in the use of GeoGebra which can be utilized to teach geometry by means of visualisation. Literacy educators noted tools such as Storybird and Padlet for the enhancement of

creative writing and reading comprehension. Such revelations put Chai et al. (2013) and Voogt et al. (2013) into perspective as they share the same view by stating that teacher competence relies on the dynamic integration of technological, pedagogical, and content knowledge. Teachers in this study requested professional development contextualized in a way to advance from generic training on ICT to its application specific to different subjects.

5.3.2.2 Challenges when integrating digital technology

Barriers to integration were the third sub-questions, i.e., what barriers hinder teachers from integrating digital technologies into Grade 7 curriculum delivery? From the findings, it has been deduced that barriers are both systemic and personal.

Systemic infrastructure is neither adequate, nor is the internet always connected. Devices are old, and there is also a problem with space in classrooms.

Professional: There is no support; training does not go on and mostly amounts to just one-off workshops.

Personal barriers include anxiety, fear of failure, and uncertainty about using technology in front of learners. In the study by Padayachee (2017) corroborated by Nyathi and Joseph (2024), it was found that indeed the persistence of resource inequities and minimal pedagogical support were still the main challenges in South African schools. This confirmed what the teachers have articulated:

'we feel isolated in our attempts at innovation without adequate mentoring or even time to try out something new.'

Despite these challenges, teachers articulated interest and zeal to pursue the development of digital competence if there would be sustained practical training support in tandem with the curriculum delivery. Using digital technology for pedagogy presents numerous obstacles for teachers. Poor infrastructure, limited technological efficacy, lack of support for educators, and a lack of training to integrate digital technology were among the difficulties. Poor infrastructure includes unstable Wi-Fi connections and a lack of digital technology equipment as a result of financial difficulties. Teachers were forced by these challenges to forego the use of digital technology in favour of more conventional teaching strategies that did not require technical assistance. Researchers Chigona and Chigona (2010) also found that teachers who were expected to use digital technology lacked the technical support they needed to integrate it. When teachers required technical assistance, the technicians took their time arriving, leaving them to wait. Teachers' enthusiasm for incorporating digital technology was impacted by this. Hayes (2005) made the case that principals

should help teachers by implementing professional development initiatives. The schools in this study likewise struggled with the problem of viable and insufficient resources. Some schools just lacked a strong enough Wi-Fi connection, so in order to connect, you have to be a specific distance away from the office. As a result, educators who taught in locations farther from the office were unable to use the Wi-Fi while teaching. This made it difficult for teachers to pre-download materials, which deterred some from incorporating this technology into their grade 7 curriculum delivery.

Another barrier was that the schools lacked enough support systems to help teachers who encountered problems with the technology in their classes. Unfortunately, these schools lacked a robust support system, which is necessary when working with senior teachers who are still learning how to integrate digital technology. Teachers were deterred from using digital technology for pedagogy by such circumstances. Schools must have teachers who possess TPACK in order to fully integrate digital technology into their teaching pedagogy when delivering the curriculum in grade 7. In light of this, Buabeng-Andoh (2012) contended that effective school programs that provide assistance to educators are necessary for the successful integration of digital technology.

The results of the study indicate that most teachers do not have adequate skills for the successful infusion of digital technology into their lessons. This was supported by observation and interview data which indicated that most teachers were at the entry level meaning that the use of digital technology by teachers is limited to interaction. Therefore, results clearly indicated that though educators appreciate and realize an advantage of digital technology theoretically, in practice, they have challenges inhibiting them from utilizing it to deliver a curriculum, particularly for Grade 7. Much work has to be done before complete integration of digital technology can be achieved.

The study found that numerous structures must be put in place to promote integration because of the insufficiency of digital technology devices and teachers' incapacity to use them. Teachers require technical assistance as well as training. In order to ensure continuous development and integration, schools must address these concerns from a policy perspective, which would guide the ICT plan and implementation.

Accordingly, the researcher concludes that the numerous difficulties teachers encounter have an impact on their choice to include digital technology or not. Teachers are impeded in their efforts to incorporate digital technology for curriculum delivery when it is surrounded by obstacles to pedagogical integration. In order for digital technology to be fully integrated into classrooms, certain obstacles must be removed. One issue was that there weren't enough computer laboratories for the number of students they were designed for. Financial support is necessary for schools to improve

the strength and dependability of their Wi-Fi. An atmosphere that promotes the use of digital technology will be established after these issues are resolved, and the acceptance of digital technology integration will undoubtedly rise.

The results have led to the conclusion that these difficulties do have an impact on the use of digital technology in pedagogy. Both separately and in combination, these difficulties impact integration. As a result, overcoming one obstacle does not always translate into greater integration. No integration will occur if digital technology devices are unavailable, even if you offer support mechanisms for ICT issues. By addressing all of the difficulties educators face, an atmosphere that promotes the use of digital technology in pedagogy will be established.

5.3.3.3 Advantages of integration of digital technology for curriculum delivery

It is important to highlight that the researcher discovered that every participant in the study believed that digital technology had a significant influence in the classroom. They all agreed that the advantages of digital technology greatly outweighed those of traditional teaching, even though some teachers were hesitant to include it into their curriculum delivery. Since all teachers agreed that the curriculum was time-specific and packed with information, one of the advantages that teachers mentioned was the potential of technology to save time. Technology can change the method of delivery and it can play other media like video to see another perspective for students. Therefore, all teachers agreed that digital technology was important in the classroom and it would make their work easier. Despite the positive comments, however, some teachers still shield away from using digital technology in their classrooms.

Numerous factors influenced how teachers integrated digital technology, and for some teachers, the primary reason for not integrating digital technology was a combination of these factors. Tondeur et al. (2016) posits that schools that offer resources like peer support, digital technology support, and policy implementation are more likely to encourage educators to use technology in the classroom.

According to the researcher's findings, all teachers believed that digital technology greatly benefited both the pedagogy employed during teaching and learning as well as the delivery of the grade 7 curriculum. It made activities easier to complete and made it possible to extend learning outside of the classroom. However, for execution, teachers need sufficient training and assistance. Since they are completely aware of the benefits that digital technology offers, they must eliminate the previously described issues before fully integrating it.

5.4 Integration of the findings with the TPACK framework.

Results may be integrated within the TPACK domains by different patterns of strength and constraint across teachers' knowledge areas:

TPACK Domain	Empirical Observation	Supporting Source
TK	Teachers exhibit functional digital literacy but limited innovation.	(Koehler et al., 2013)
PK	Pedagogical strategies are teacher-centred without digital pedagogy.	(Voogt et al., 2013); (Redecker , 2023)
CK	Teachers have good knowledge content but do not have skills for digital adaptation.	(Shulman, 1986)
TPK	Teachers cannot relate pedagogy to the possibilities that technology offers.	(Chai et al., 2013)
TCK	Few examples of digital applications representing subject-related content.	(Angeli & Valanides,2013)
PCK	Pedagogical competence exists, though disconnected from technology.	(Harris & Hofer, 2009)
TPACK	Incomplete integration due to structural inequities and training gaps that would make it effective.	(Mishra & Koehler, 2006)

This match proves that the digital practices of teachers are based mainly on technology and content knowledge, with very little pedagogical integration. The TPACK framework,

therefore, becomes a useful interpretive tool by which one can understand that real digital competence demands not only access and skill but an understanding of how technology changes learning.

This study, taken through TPACK (Technological Pedagogical Content Knowledge by Mishra & Koehler, 2006; Koehler & Mishra, 2009) perspectives, reveals the complex dynamic relationship between different knowledge areas and teachers' perceptions of their digital competence for grade seven curriculum delivery. This framework is particularly useful for an explicit understanding of the strengths and weaknesses that were observed in participants' integration of digital technologies. It found that teachers have good content knowledge (CK) and pedagogical knowledge (PK), thus allowing them to confidently deliver lessons within their subject area. Technological knowledge (TK) varied; some teachers were upbeat and ready to try new digital tools while teaching, whereas others were not confident or simply fell back on the use of traditional methods. This thereby created an imbalance that does not allow for the effective intersection of the three areas that TPACK highlights as important for meaningful digital integration. Secondly, barriers infrastructure, training, and peer support act as constraints in achieving fully integrated TPACK. For example, participants narrate their agony in harmonizing digital resources with lesson plans whenever connectivity or hardware does not support their efforts. This goes a long way to further support the initial claim by Ertmer and Ottenbreit-Leftwich (2010) that teacher beliefs and contextual realities strongly mediate the adoption of technology thus inhibiting the possibility of TK being enacted meaningfully alongside PK and CK. Where integration was successful, lessons demonstrated TPACK in action. Digital simulations, interactive content, or collaborative platforms when integrated by teachers with established pedagogical strategies resulted in richer learning experiences as well as more engaging ones. Such a contention underscores the revelation by Mishra and Koehler, (2006) that TPACK allows transformative teaching going beyond substitution to innovation. Notably, increased learner engagement evidence and more personalised instruction further underscore how the framework can simultaneously support both curriculum delivery and 21st-century skills development.

Addressing the main research question: How are perceptions of educator digital competence for the integration of digital technology in pedagogy in Grade 7?

Findings reveal that educators perceive themselves as partially competent about digital integration confidence heavily relying on prior training, institutional support, and infrastructure availability. Teachers recognized the capabilities of digital devices for the enhancement of learning but also indicated that, in the absence of adequate support, their TK would remain underdeveloped. This serves within the TPACK framework to

illustrate a gap that teachers are confident in CK and PK but less assured about consistently integrating TK. Effective digital integration requires more than just having technology available, such as professional development explicitly targeting the domains of TPACK, systemic support to overcome infrastructural barriers, and a school culture that promotes experimentation and collaboration. Until all these enabling conditions are met, teachers' perceptions of their digital competence will continue to reflect a partial rather than holistic enactment of TPACK.

5.5 Attitudinal Shifts and Future Orientation

A major theme was the change of mind of educators regarding digital technology after the COVID-19 pandemic. What was initially considered as an external imposition is now gradually being perceived as a necessity for professional development and engagement of learners. This shift echoes what Howard et al. (2021) term a "transformative attitude change," moving from compliance to actual pedagogical experimentation. Some participants shared sentiments of digital fatigue, a symptom resulting from constant adaptation and evolving platforms.

Participant 5 was of the opinion that "Every year there's a new app or system. It's hard to keep up."

These feelings show the struggle between new methods and lasting support in online learning (Selwyn, 2019). However, the main path among members showed hope and readiness to change. Thought logs showed growing trust and self-power matching (Bandura, 1997) idea of self-power, which says that successful experiences and watching others do well help strengthen belief in one's abilities. The teachers saw a time when digital integration would be normal rather than an extra, in the method it becomes infused with pedagogy not as an add-on. This hope meets UNESCO's (2023) push for green digital schooling systems that empower both educators and learners.

5.5 Recommendations

Based on the inferences made from this study, the following recommendations could be made to ensure that educational technology finds its way into the classrooms of the Western Cape. There is a need for periodic workshops towards fostering TPACK growth. Teachers should have opportunities for how they can integrate digital technology into their pedagogy while affecting the grade 7 curriculum. In addition, teachers should be encouraged to build lessons with digital technology as they are teaching and delivering the curriculum. To help teachers with low integration efficacy feel comfortable using digital technology in their teaching, peer collaboration must be emphasized. Though taught how to use digital technology in classroom pedagogy, these teachers were not skilled in its actual day-to-day implementation. For the

motivation of teachers to keep up with the technological trend and to arm them with TPACK, more supplemental training sessions should be regularly conducted. It was revealed during the interviews that the training of WCED is generic and needs more focus on being specific to didactics as opposed to general. If teachers get training on using digital technology for their subject matter, they will be more willing to use it for presenting curriculums in grade 7. We should always remember that without the availability and accessibility of digital technology equipment there can never be integration of technology in the classroom. The school must have a sufficient amount of digital technology devices that is well-managed and operating at peak efficiency. The availability of various learning support technologies can increase teachers' motivation to incorporate technology into pedagogy and content. This is consistent with the findings of Chigona et al. (2014:4), who show that teachers get "professional satisfaction" from integrating ICTs into their lesson plans.

Many educators were quite unhappy with the on and off slow connectivity of the Wi-Fi. This kills the excitement of teachers for using technology. The WCED needs to ensure full school coverage with strong signal strength and fast enough internet speed so that only good working institutions can maintain a continuous working culture of technology-enhanced lesson delivery. It's also important to remember that the development of TK, PK, and CK as well as the connection between PCK, TCK, and TPK to form TPACK necessitate the availability of technological equipment. The motivation of teachers to incorporate the three elements is crucial. According to Leendertz (2013) teachers' perceptions on the nature of teaching and learning are closely related to the role digital technology plays in the classroom. This shows that for educators to be willing to use digital technology, they need first to understand the benefits it can deliver and supported by an environment that encourages its use. Teachers working in collaboration and communication with each other within the classroom situation will improve teacher efficacy in addressing technical problems as well as better understanding the integration of digital technology as pedagogical tools.

Emphasis must be made on teaching and preparing students with the skills they need to use technology for learning in a meaningful way if we are to produce adept at using technology and responsible learners. In light of the aforementioned, a multifaceted training strategy is suggested to teach learners how to use technology responsibly and safely.

To help and direct teachers in selecting technologies for lesson planning and facilitation, subject-specific training programs should be held. At the school level, these programs can be offered by

▪ ICT champions and/or committee members;

- Teachers with ICT expertise who are eager to share; and
- Subject heads, who receive knowledge first and then relay it to their subject team.

Additionally, as ICT champions and committees were shown to be excellent resources for technical assistance and training at schools, it is advised that technology-rich schools establish them. For digital technologies to be successfully integrated and a collaborative culture for technology use in education to be fostered, schools must have ICT champions and committees. Hauge and Norenes (2014) state that these advocates exercise leadership by promoting a "distributed leadership" model that incorporates a number of stakeholders from different positions within an educational institution, such as administrators, educators, and IT personnel. Sharing information and assistance is made possible by this framework, which is essential for creating a unified vision and removing barriers to ICT adoption. The establishment of committees with representatives from several departments lays the groundwork for continuous professional development, enabling employees to accept and adjust to technology innovations in ways that improve instruction and learning.

5.6. Limitations to this study

This study is a good insight into how digital technologies are being integrated into the Grade 7 curriculum delivery, but it comes from schools that have resources.

5.6.1 Limited Sample Size and Scope:

This study has a small specific sample of six educators from two Quintile 5 schools in the Western Cape. The small size of the sample puts a limitation on how much generalization can be made to a wider population. Small samples usually produce imprecise results and may not show statistically significant effect where one exists, hence missing the real effect (Faber, 2014). Also, since this is only one grade and some individual subjects, it may not describe fully the variation in digital technology integration by educational context.

5.6.2 Selection bias sets in because of purposive sampling.

Though purposive sampling permits an intensive study of particular cases, it allows selection bias. Schools chosen are those identified with strong infrastructure and actively using digital technologies; hence, they may not represent all schools within the region. Such a bias limits any generalization of findings to schools with different resource levels and degrees of integration technology.

5.6.3 Contextual Limitations

A study at Quintile 5 schools, which are financially independent and particular to urban or suburban areas, does not reflect the predicament of schools from the lower quintiles or rural setups. Conditions in these schools vary vastly concerning infrastructural capacities and access to digital technologies; thus, it influences the implementation and effectiveness of digital tools in teaching and learning.

5.6.4 The Hawthorne Effect

The knowledge of being involved in a research study could have sensitized the participants and thus influenced their behaviours and responses. This is referred to as the Hawthorne effect. The educators might have changed their normal practices or provided responses which they thought were required, rather than what their normal behaviours and attitudes towards digital technology integration actually is (Creswell, 2014).

5.6.5 Lack of Longitudinal data

Longitudinal Data is missing This study pictures digital technology integration at one definite point in time. In the absence of longitudinal data, assessing the sustainability of digital practices and their long-term impact on teaching and learning outcomes becomes rather difficult. A future study conducted longitudinally would be recommended to embrace changes over time in addition to evolving nature aspects of digital technology integration within education.

5.6.6 Limited perceptions

The study draws its data mainly from the perception of educators and therefore may not adequately represent students, parents, and other stakeholders in the educational process. A more diversified perspective would be better because it would reflect more fully and accurately the different forces at work in integrating digital technologies as well as their effects on education considered broadly.

5.7 The researchers' final remarks

The use of digital technology in South African primary schools may enable the successful curriculum delivery at Grade 7 level. This is very vital to educational institutions that have low funding and a background of underperforming students. The researcher is persuaded beyond doubt that for the infusion of digital technology to pick up speed, stakeholders should be able to identify the challenges confronting teachers and make efforts geared towards surmounting them. To create an atmosphere that

promotes integration in more schools, factors that motivate educators to employ digital technology when delivering the curriculum in Grade 7 must be discovered. It is crucial that these problems be addressed jointly because, as this study has shown, teachers are typically discouraged from using digital technology by a combination of factors. Because findings indicated that many teachers have a positive outlook toward digital technology but low self-efficacy, it is important to have active ICT committees in schools. This problem can be mitigated by the ICT committee. The infusion of digital technology into the delivery of curricula has revolutionized education at particularly this level of education, grade 7 whereby vibrant and effective learning environments are created. Availability and support digital tools shape positive perception by the teachers and students; thus, they become enthusiastic and improve teaching and learning results. Well-established digital infrastructures, fast internet, working devices, and interactive platforms are essential smooth integration of technology. Schools with resources such as computers, tablets, and projectors give an enabling environment to the teachers to try new ways of delivering curricula (Kirkwood & Price, 2014). It can give multimedia content simulation real-time feedback on lesson interactivity that keeps the learner engaged. Easy availability of digital resources removes typical technical frustrations associated with their use; it builds the confidence of teachers to use technology in their teaching practices. Good training and continuous learning help in making the views of digital technology more positive among teachers. Trainings give them the right skills to use digital tools and help them add these resources into their lessons (Mishra & Koehler, 2006). For example, classes on online systems or group meetings that focus on software related to curriculums help teachers see technology as a partner instead of a problem. As they get better at using digital tools their confidence gets stronger which leads to a happier way of thinking about the role of technology in education. Administrative, technical, and digital support form the base for perceptual formation among teachers. Technology-oriented schools with policies, incentives, or supportive leadership instill a sense of worth in educators and push them towards innovation. Moreover, other forms of peer collaboration such as sharing best practices and troubleshooting challenges help foster a sense of belonging that works to minimize change resistance (Ertmer et al., 2013). Observation of successful implementation by peers creates adoption among teachers themselves. Having web-based tools that are aligned with curricula helps educators see tech as a way to attain scholastic goals rather than extra work. Tools like scholastic applications, online teaching sites, and interactive whiteboards improve lesson delivery by matching content with learning outcomes specified in frameworks related to the Curriculum and Assessment Policy Statement (CAPS) of South Africa. This alignment ensures that digital technology becomes an integral part of realizing teaching goals and hence improves its perceived

value. Students' positive responses to digital technology work as a motive force in the perception of teachers. When students show greater engagement, comprehension, and interest toward lessons delivered through digital technologies, then those educators become more willing to adopt such technologies. For instance, learning apps or virtual field trips may take vast themes within their reach and make them palatable, thus creating a dynamic classroom atmosphere. Visible results on students' performance and motivation cement the effectiveness of technology thereby making the teachers even more willing to explore its applications. Though the availability of digital technology is major, common barriers must be addressed to create positive perceptions. Insufficient funds, in not enough time for training, will leave many teachers unable to successfully implement technology (Ertmer, 1999). Fair resource distribution, flexible professional development programs, and continuing technical support will go a long way in diminishing these challenges and building positive attitudes toward the use of digital technology.

5.8 Contribution

This study's main goal is to learn more about how teachers view digital competency in educators in order to integrate digital technology into pedagogy for Grade 7 curriculum delivery.

It will also highlight the importance of applying Technological Pedagogical Content Knowledge (TPACK) in curriculum delivery and how this acquired area of understanding can influence their innovative use of instructional technology in class. Modern technical developments in the twenty-first century have led some to consider technology as an educational instrument. In their article "Technological Pedagogical Content Knowledge: A framework for teacher knowledge," published in 2006, Punya Mishra and Mathew Koehler presented the TPACK framework.

The concept does emphasize how critical it is to merge technological savvy with content knowledge alongside pedagogy i.e. how that content is delivered. Technological Pedagogical Content Knowledge (TPACK) refers to the teaching strategies that a teacher employs while using technology to teach a particular subject. For example, it could be the grouping of students by the teacher for them to undertake technological activities. C, P, and T join together to form TPACK which is an acronym for pedagogy, content, and digital technology integration. The content is the topic or subject that a teacher presents in class.

The way a teacher implements the curriculum to accomplish lesson outcomes is known as pedagogical knowledge (P). The ability of teachers to use technology in the classroom is known as technological knowledge (T). "The ability of a teacher to know

what teaching approaches fit a content and also knowing how elements of the content can be arranged for technology understanding of learners" is what is meant by Pedagogical material Knowledge (PCK) (Mishra & Koehler, 2006:1027). Teachers use technology to teach a subject known as Technology Content Knowledge (TCK). For instance, math can be taught by teachers using software.

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APPENDICES :

Appendix A: Ethics Clearance

Cape Peninsula University of Technology

Cape Peninsula University of Technology

Private Bag X8, Wellington, 7654
Jan van Riebeeck Street, Wellington, 7654
Tel: +27 21 864 5200

P.O. Box 652, Cape Town, 8000
Highbury Road, Mowbray
Tel: +27 21 680 1500

FACULTY OF EDUCATION

On the 26th of April 2024 the Chairperson of the Faculty of Education Ethics Committee of the Cape Peninsula University of Technology granted ethics approval (EFEC 10-04/2024) to Clifford Cloete for research activities related to a staff project / degree project)

Title:	PERCEPTIONS OF EDUCATORS DIGITAL COMPETENCIES FOR MOBILE TECHNOLOGY INTEGRATION INTO GRADE 7 CURRICULUM DELIVERY.

Comments:

The EFEC unconditionally grants ethical clearance for this study. This clearance is valid until 30th April 2027. Permission is granted to conduct research within the Faculty of Education only. Research activities are restricted to those details in the research project as outlined by the Ethics application. Any changes wrought to the described study must be reported to the Ethics committee immediately.

Please delete the old letter (issue 24 April 2024) and use this one, with the slight change in the title of the study.

Date: 9 May 2024

Prof P Boer

Acting Chair

EFEC

Appendix B: WCED approval

Western Cape Government
Education

Directorate: Research

meshack.kanzi@westerncape.gov.za
Tel: +27 021 467 2350
Fax: 086 590 2282
Private Bag x9114, Cape Town, 8000
wced.wcape.gov.za

REFERENCE: 3A66270C1300001B-20240510
ENQUIRIES: Mr M Kanzi

Mr Clifford Cloete
45 Fifth Avenue
Cape Town
7780

Dear Clifford Cloete,

RESEARCH PROPOSAL: PERCEPTIONS OF EDUCATOR'S DIGITAL COMPETENCIES FOR MOBILE TECHNOLOGY INTEGRATION INTO GRADE 7 CURRICULUM DELIVERY.

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

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **5 June 2024 till 30 September 2025.**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Mr M Kanzi at the contact numbers above quoting the reference number.
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

The Director: Research Services
Western Cape Education Department
Private Bag X9114
CAPE TOWN
8000

We wish you success in your research.

Kind regards,
Meshack Kanzi
Directorate: Research
DATE: 5 June 2024

Appendix C: Letter of consent: Principals

Clifford Jerome Cloete
Faculty of Education and Social Sciences
Cape Peninsula University of Technology
Highbury Road , Mowbray
P.O Box 652

Dear Sir/ Madam

A REQUEST TO PRINCIPALS FOR PERMISSION TO CONDUCT RESEARCH

I am currently a part-time master's student at the above-mentioned institution. I am requesting permission to do research at your school. This will entail interviews and observation of grade 7 educators while delivering the curriculum using technology or instructional technology.

My thesis is titled: PERCEPTIONS OF EDUCATOR'S DIGITAL COMPETENCIES FOR MOBILE TECHNOLOGY INTEGRATION INTO GRADE 7 CURRICULUM DELIVERY.

I am interested in exploring educator perception of the use of instructional technology and how and why they would choose instructional technology in their pedagogy. The research would guide the Western Cape Education Department to formulate programmes to encourage the effective use of instructional technology into their curriculum delivery. The researcher intends to highlight enabling factors and barriers and encourage the use of technology by teachers. Due to the ubiquitous nature of mobile technology it is imperative that teachers in the 21st century will take advantage of this phenomenon.

Teachers who wish to take part in this research will choose a date to be interviewed and observed that is convenient to them. My interview period is open from Monday 12 August to 16 August 2024. Measures will be taken to ensure anonymity of the participants and schools by using pseudonyms when reporting findings. (No research can be done in term 4)

All information gathered will be used solely for research purposes. Participation of educators is voluntary and they are under no obligation to participate in this study.

Find attached the WCED approval letter allowing the researcher to conduct research. If more information is needed about my research, please feel free to contact me on my email: cjcloete794@gmail.com or alternatively my supervisor's Professors ChigonaA@cput.ac.za or LivingstonC@cput.ac.za . I would be most grateful if you would assist me in this research.

Yours sincerely
Clifford Jerome Cloete
216168686

Should you agree, you are hereby asked to sign this letter.

Principal

_____

Signed at _____on the _____ day of _____ 2024

Appendix D: Letter of consent: Participants

CONSENT FORM FOR PARTICIPANTS

I _____ (Name and Surname) have been made aware of the following by the researcher :

- That an audio recording will be used during interviews to capture accurate data. The transcript will be made available to me after transcript has been finalized for my feedback and confirmation of information.
- That the researcher will observe a lesson when I use instructional technology in my pedagogy.
- I have a right to withdraw from the study at any time without providing reasons.
- That my name will not be mentioned when reporting findings or in any output of the research.
- That there are no foreseen risks involved in this study. However, safeguards and has been taken to mitigate both known and unknown risks.
- Assured me that the data will be kept safe.

I am satisfied as all my questions regarding this research has been answered and I am aware of the nature and purpose of this study. I hereby consent to be a research participant for this research project titled "PERCEPTIONS OF EDUCATOR'S DIGITAL COMPETENCIES FOR MOBILE TECHNOLOGY INTEGRATION INTO GRADE 7 CURRICULUM DELIVERY."

_____ _____

Name and Surname of participant Signature

_____ _____

Name and Surname of Researcher Signature

Date : _____

Appendix E:: Data instrument 1: Interview Instrument Student :21616868

Cape Peninsula University of Technology

Sub-Research Question	Objective	Interview Question
S1. What technological knowledge is necessary for digital teaching?	To determine the current competencies of educators.	1. What technological knowledge do you think is needed by educators to implement digital technology in their pedagogy?
		2. How long have you been using ICT in curriculum delivery?
		3. How do you achieve collaboration and critical thinking when using digital technology?
		4. How do you feel about digital technology use in the classroom?
S2. How are teachers integrating digital technologies into their pedagogy?	To determine the extent of technology use during lessons.	5. How did you acquire the skills to integrate technology into curriculum delivery?
		6. What are your perceptions of instructional devices used during teaching and learning practices?

		7. How is technology integrated into your teaching pedagogy?
		8. Tell me more about the use of digital technology used at your school?
S3. How does the presence of technology impact on teaching practices?	To determine the impact of digital technology in delivering the curriculum.	9. How do you perceive educator attitudes when using digital technology?
		10. Novice Teachers 11. Experienced teachers
		12. What could be done to encourage the use of digital technology?

Appendix F: Data instrument 2**: Reflective Journal**

1. When you started teaching did you feel confident using instructional technology?
2. How did you overcome the barriers when using instructional technology?
3. What were the barriers that you overcame?
4. What is your current experience when using instructional technology?
5. Who do you perceive as being responsible for encouraging the use of instructional technology when delivering the curriculum?
6. How did the impact of instructional technology change the following aspects in learners?

a) Collaboration

b) Creativity

c) Critical thinking

d) Communication

REFLECTIVE JOURNAL

PARTICIPANT : _____

RESEARCH TOPIC :

PERCEPTIONS OF EDUCATOR'S DIGITAL COMPETENCIES FOR TECHNOLOGY INTEGRATION INTO GRADE 7 CURRICULUM DELIVERY.

RESEARCHER : CLIFFORD CLOETE

STUDENT NO. 216168686

MASTERS' RESEARCH

SUPERVISORS: PROF. AGNES CHIGONA

PROF. CANDICE LIVINGSTON

Appendix G: Data instrument 3**: Observation**

Participant: _____

SUBJECT : LESSON	
DIGITAL TECHNOLOGY USED	
PEDAGOGICAL SKILL	
LEARNER INVOLVEMENT	
HOW THE FOLLOWING IS INCORPORATED INTO THE LESSON : COLLABORATIVE LEARNING	
CRITICAL THINKING	
CREATIVITY	
COMMUNICATION	
LEARNER CONFIDENCE AND INTEREST	
CONSOLIDATION USING TECHNOLOGY	
OUTCOMES OR OBJECTIVES REACHED	

Appendix H: Interview transcripts

Interview Transcript: Participant 1

Researcher

1. What technological knowledge do you think is needed by educators to implement instructional technology in their pedagogy?

Participant 1

So basically for me personally I studied and with us we did library sciences back then and that's where we got introduced to technology. And I think the department is lacking in the sense of really equipping our teachers with the correct tools when it comes to using technology within our classroom setup and with our daily lessons. A lot of schools are not aware there are many platforms that we can use to implement technology where we link our curriculum and the delivering of the curriculum with technology. So a lot of us self-educate ourselves with these new technologies and platforms that we can use to deliver curriculum using the latest technology.

Researcher

How long have you been using ICT in curriculum delivery?

Participant 1

So when I started at school in 2011, I started teaching. There was no technology at the school. The only technology we had was a computer room and a printing machine and in 2012 that I started using a movable projector, where we used a normal white paper against my board and we started projecting little videos using my personal laptop for the kids just to engage them. The Internet and obviously, its concrete. They can see this, so in 2012 I started using ICT in my the delivering of the curriculum, no yeah, the curriculum itself, that's when I started using technology.

Researcher

How do you achieve collaboration and critical thinking when using instructional technology?

Participant 1

Well, this is really nice for the kids. This is a nice question, the kids love. They love, remember how Kids are so advance and no more than the teachers. So the minute a whiteboard goes on and I use the stylus where I make it an Interactive Whiteboard, the

learners they all want to engage in this because they know so much. They just all want to come along and be part of the lesson, whether they know the answers or not, the fact that they are using technology just excites them all over. So they love coming to the board. I use the visualizer another modern thing that was introduced, and this visualizer can take photos. And these kids were in awe because now they could see ma'am could take photos and use it into a lesson. As I was sitting at the desk and I could do this. So for kids, this just opens up their thinking. They have got lots of questioning. And I'm ma'am. How did this work? How can I do this? And our kids are now all getting on board of this whole technology train or bandwagon, as you may say.

Researcher

How do you feel about mobile technology use in the classroom?

Participant 1

I'm a forerunner for this. I love technology. I think it's been the best thing for our kids. We've been lagging behind the other countries when it comes to this and I'm a forerunner for this. I mean, these days you can take a cell phone. I'm a science teacher .We can go outside and use the app called picture this and we can take a photo of a leaf and you can tell me what's wrong with this. What nutrients it needs, and this excites kids because I never knew this before with some of the older colleagues are not in agreement. But I'm a forerunner for mobile technology in the classroom.

Researcher

How did you acquire the skills to integrate technology into curriculum delivery?

Participant 1

So obviously at university we did library sciences, but I also it wasn't good enough for me to equip myself. So I did a little short course here and there just to educate myself and to empower myself with the ongoing changes in technology. So when our school introduced the Interactive Whiteboard, we had a whole training session. We did the Google Glass and training session just to get myself COVID also forced a lot of things to change, and that's where all I really had to empower myself because of the fast pace changing of the curriculum. Now because of COVID.

Researcher

What are your perceptions of instructional devices used during teaching and learning practices?

Participant 1

I think it's for the betterment of the kids. Not all kids are good at writing. Not. I mean, I know of schools that use. They have no longer. They have writing books. They have got an iPad. I think it's brilliant for the kids. I look at all our kids with these, but they've got a copy of things and we've and we're duplicating this where we could just have it on a iPad. Why not? So, because our country is moving in that direction. We as a school or as an education sector should also move there. So I too, I am a firm believer that computers should be in every class, every child should be have access to digital devices at all times.

Researcher

How is technology integrated into your teaching pedagogy?

Participant 1

So I do all the fun subjects, science and technology itself, so a lot of my lessons would be PowerPoint based. There are even times that I use my voice on to the PowerPoint like just to show our kids our kids do a lot of PowerPoint presentations to me. So I use it in almost every aspect of my delivering of the curriculum, even when it comes to math, we do a program called green shoots where kids do brain quest online and that's us, consolidating the math that was taught in class. So I try and use it into every sphere of my teaching. I try and use some sort of technology whether it is on their mobile devices, the computer lab or on the Interactive Whiteboard.

Researcher

Tell me more about the use of instructional technology used at this school?

Participant 1

So we are quite limited in the sense that we have a computer room and our kids can't always get to access to it. So we've got about 15 machines and we are 7 hundred and two learners, so it does limit us to actually use it effectively or optimally. As I would say with so with our school, we've got the computer lab and we try and use it, quite often mostly for our green shoots program, our learners recently completed their Pace test on this as well, so that’s where we add life orientation into technology, and use an electronic device. So we try doing that. They did a lot of research now for their careers in the computer labs and like I said, the Interactive Whiteboard is our main way of getting this across to the learners.

Researcher

How do you perceive educator attitudes when using instructional technology?

Participant 1

A lot of teachers are very hesitant. We have all this fancy equipment. I think I was I not, I borrowed everyone's stylus because the nips they run out and none of the teachers at our school are actually optimally using technology yet, they are very hesitant. A lot of the older staff is very hesitant as they are, it’s new to them and they are stuck in some of them, stuck in their ways of chalkboard and talking. That's how they think it should learn. And I think a lot of our majority of our stuff is hesitant. And you've got this 10%, that's actually forerunners for this technology.

Researcher

That answers question 10 and 11, yeah, what could be done to encourage the use of instructional technology?

Participant 1

I think our mind-sets should be shifted as educators because this is the future. Our mind-sets should be shifted and we should encourage one another and not laugh at each other’s failures. If we don't understand or we not, we don't know our way around things. We should ask one another. That or that platform should be there where we can speak to one another freely on saying, look, I'm not comfortable doing this. Are you able to assist? So basically just helping one another along and just a complete 360 when it comes to our mind-sets , this and more courses from the department. Because our teachers do feel that our workshops are late in the afternoon, so maybe just try and bring it into a different way of presenting where we can look at our own time at our own pace going through these. These sessions that I present because of many of our people will be we don't want to ask questions if we are in the sessions because I don't want to be highlighted that I'm not aware of how to use the device or how to incorporate technology information into a lesson. So maybe get that narrative change and it will help a lot.

Interview Transcript: Participant 2

Researcher

What technological knowledge do you think is needed by educators to implement instructional technology in the pedagogy?

Participant 2

I think it's like in our context, our teachers definitely need to use their laptops because everybody has a laptop. If we don't have our school has laptops that educators can use in doing their work in delivering the curriculum, and with that said, because we have the laptops available, there are classes all our classes in the intermediate senior phase has interactive whiteboards. So that to those two components will then complement each other. Whereby you have access, so nothing prevents you from using those two devices, when delivering curriculum.

Researcher

How long have you been using ICT in curriculum delivery?

Participant 2

Since I moved up to Grade 7 and when it was actually installed in here at our school because we found that as like with using technology, it just enhances the curriculum and does not overtake whatever you want to implement or teach in the class. As there to complement what you so I think was like I'm now since 2017 I'm in Grade 7 and it's actually just like enhancing whatever lesson you teach, bringing the curriculum across.

Researcher

How do you achieve collaboration and critical thinking when using instructional technology?

Participant 2

How do you? I think it's like, especially because you and the learners and looking at the type of child and the generation of today children are actually they want technology, there's not a single child that doesn't have a cell phone whose parents do not have at home, they are exposed to technology and they actually want to see that, and that makes them sit up. So you get learners, they participate more eagerly if they see that. Oh, ma'am, it's with it. You know, so it's like you interacting and you using those devices. To an extent, it brings that connection and with them seeing it's like oh. It's like ma'am knows how to use this. Ma'am knows how to use that. You get better

cooperation from from that. So it's like collaborations, like mostly with your learners because at that given moment they are with you in class. Yes, with the teachers, with your colleagues. This like it says like, you know, what kind of material are you using that I can use that will complement? But just like most of the times, you are guided by the learners in class and they will then like it's like OK, I need to approach this class on that angle, so I'm going to use this and I'm going to use that and then you will tap into your colleagues and says like, you know, do you have a program that I can use because. “Die graad sewes gaan my nou so challenge”. This group was like, no, they like they so I was like collaborating with your children, who's guiding you and also with your colleagues when it comes to, you know, content and those kind of resources.

Researcher

How do you feel about mobile technology use in the classroom?

Participant 2

At our school, at our, with our given context, I'm not so keen on that because our children, they need to be upskilled as to how to use those mobile phones at this given moment. They lack that where they know us like how how to use your cell phone. That kind of etiquettes we will find that children will push and it's like you don't know the extent to the device that they are using as like you know, are you really engaging with the curriculum, so monitoring that in class because to an extent it's like. In our classes, we can't really monitor in the computer room I can monitor because I know exactly where you are at. I can freeze your screen, but with the cell phone it's a bit. It's a bit difficult because I can’t hack into your device because at that given moment today you've got a Oppa. You've got the Huawei, you've got the Apple. So it's like, how do I, from my device block you so that it's like you know. And for that reasons, I would say it's like I wouldn't encourage it at our school. I wouldn't encourage that.

Researcher

How did you acquire the skills to integrate technology into curriculum delivery?

Participant 2

I've got a son. I think it's like having children. I think having children they open up your mind like. You have to stay with it and not opening yourself to technology. You are going to stay behind and it's like with my son. I'm paying for your contract, so I need to track. I need an app on my phone to see like, what are you doing? Because ultimately I'm also accountable for what you are exposed to. So me familiarizing myself with the software that you have on your phone. Do I have access? Can I, at any given moment track you. You told me that you're going to youth and you ended up at your friend's

house, so that kind of thing. So it's like your children. They actually open up your mind. It's like I need to stay on top of this, you know, because ultimately I am equally responsible.

Researcher

What are your perceptions of instructional devices used during teaching and learning practices?

Participant 2

I think you need to be very careful in your planning when you decide tomorrow I need to. I want to teach my learner something about quadrilaterals. Math is my sphere of influence. So tomorrow we are going to in classes like check out the like the properties of quads. So on your device I give a keyword and you punch in that keyword. Do you are you going to get to the properties of a kite? And so I need to plan thoroughly to optimize and maximize. The real usage of that mobile phone in that given moment, so that it doesn't take over my lesson. Listen and I am in full control so that when I say OK, everybody's like put down your phone. Tell me where you are at that given moment. Give me back whatever you said. It can be very tricky because children are very smart. They are not scared of technology us as adults with sometimes it's like will you will find these teachers. They don't use the whiteboard. Because they are scared children, they just blindly jump in because they're not scared to make mistake and that should scare you as an adult. So you need to be two, three steps ahead of them to actually counter, you know, should this child go to a different site or whatever? It's like hello. I know where you are at that given moment. So it's very tricky when you decide that you're going to use a device in class, you need to plan thoroughly. And to counter any event that might occur.

Researcher

How is technology integrated into your teaching pedagogy?

Participant 2

With math it's a bit difficult. I like using the board because children give me examples. I give you the definition and I test. Did you understand? And then you give it back. So the examples in my learners math books is the examples that they have given Miss. And come up with an example. No, I want to test and see whether you understood the definition that I explained. Hence you giving me a suitable example and those examples are then plot in our in our books. So it's kind of difficult to do quickly on your laptop and show it there because you don't know where this child is going to come from. So at the same time it's like you are challenged because it's like, did I teach it

properly? Did they understand it properly? Hence them giving me a suitable example and then reflect in a book not as Miss X, not as the one that coming from the from the textbook. But it's actually an example that came from you and that we put in our class and then we say learner example his example, and that means, as like everybody cooperates, because they want to see their examples in the book, and sometimes the blackboard writing on the board that actually goes faster than using the laptop.

Researcher

Tell me more about the use of instructional technology at your school at this.

Participant 2

With our lesson planning that goes every second weeks, the teacher will plot and plan and say it's like I'm going to use technology because I want to play this YouTube video because it relates to what I want to bring across to my learners. So I'm going to insert this clip in my and then at that given moment. When it's a suitable time, you tap into that, you play them the YouTube video or sometimes the children, they will come up and they will draw because it's an Interactive Whiteboard. They will draw the quad for you, and then it's like there's a kite adjacent side and they put on their markers and so they get to see. So everybody wants to come up to the board and actually like the drawing of the quad. So there's a trapezium and so is. Markers, Oh he forgot to put that so they it anytime they were like trying to correct somebody so that they can have the opportunity and chance to actually come up to the white Board and it's like OK, you forgot your markers. So I'm going to put it in there for you. So that is the kind of. So it's like you plot it in your Lesson plan and you say, OK, we're going to use technology in that lesson. And the children are going to come up to the board and they're going to actually do the actual drawings on the on the board, on the OR the Interactive Whiteboard, or you're going to play the clip for them that is relevant to what you want to teach.

Researcher

How do you perceive educator attitudes when using instructional technology? The first one is for novice teachers and the second one is for experienced teachers.

Participant 2

Novice teachers, because they're from a younger generation. They are eager to use technology sometimes too much whereby it takes it takes over the lesson. You know, way by I believe that it should complement the . So they're not scared of technology. They know how to how to use it and whatever. But with the older generation, like I said, they are scared of the technology, so they will stick to that white the chalk and what

they don't realize is that they actually stay behind, they keep on running behind that technology bus technology bus and then they forget that. Like sometimes they lose touch with their learners because, ma'am, you're not relevant. You're not staying relevant and you not being open to use technology actually not only puts us at a disadvantage, but you as as at a disadvantage as well, so. If you don't open yourself and say, be honest. Like I'm struggling a bit. Like how do I open up this PowerPoint presentation? What I'm going to do here and you know, it's like it's just us. There are always the children. They will hook up your laptop for you. It's like Mam, your image. Just like Mam, I duplicate this for you. It's like you have two screens and it's like, uh, they know. So it's like and I think it's like the older generation, they lose. If they just ask it, children don't judge. It's like because they then take advantage of the fact that it's like I will help, ma'am, set up a laptop and you know, so visualizer. There we go. So I think that is where it's like the younger generation, the novice teachers, they are more open because they are of their generation. And then my older colleagues, they are a bit scared of the technology because they don't know and we should actually teach focus on them a little bit more when it comes to technology in class.

Researcher

What could be done to encourage the use of instructional technology?

Participant 2

I think. Definitely more workshops where it's more hands on where you I think sometimes Miss X. she loses her listeners or the people that she gives us because they're too many. Now she's explaining that it's like and then you don't put up your hand to say it's like. There are 245 people in the workshop. If it's made smaller, come to a school target. Two schools in the circle, you know, and it's like have a smaller group and then your reach will be better. Otherwise if it's online people, it's like I'm going to make myself a sandwich as like I’m listening to you. But I'm also not hearing you because you've lost me because the focus group is too. It's too big. So if you zoom in and you make your Group A little bit. Smaller then people would be more open. It's like the same with children. If you work in a smaller group, they open up and they will say man, can you repeat that again? But when once the group is bigger, they feel a little bit exposed because they in that moment they feel embarrassed but not realizing the only question not some stupid question is a question not. Us so they will keep that to themselves and they will suffer the in silence because they didn't have the guts to open up and say, ma'am, will you just repeat that step again? So I think it's like the platform when hosting workshops, focus on your on your smaller groups and people will open up more and say it's like ma'am, I didn't understand so the smaller the group,

the better you reach because it's like if it's on virtually, I'm going to make myself that sandwich and that cup of tea, and then I hear you. But I'm not listening.

Interview Transcript: Participant 3

Researcher

What technological knowledge do you think is needed by educators to implement instructional technology in their pedagogy?

Participant 3

I can say from. My experience at like the school that I am at, I do think we have limited resources. And when we are provided with resources, there's not sufficient ongoing training, which creates a very big resistance. So then a lot of the teachers are feeling very confused and like the the support is not always provided, you know, which results in a lot of. Resistance and hesitation, actually just not using it. So like I said, we have smart boards in our classroom and obviously projectors we only use our smart board to project. We don't use it as an interactive smart board because when it was installed, we had training. And I think the training sessions. Once or twice, I'm not too sure, let's say. Twice and thereafter never again, so now our new teachers come in and then they would rely solely on the school's IT person, which we don't have to then do training or some sort of handover. So that's why you said that it was my Forte. Because, I mean, I was the one that. Just like stepped up and thought, OK, let's just share and teach where we can because we don't actually have a designated IT person at the school, which I think is a big lack and causes a lot of resistance. Again, like I said resistance and hesitation.

Researcher

How long have you been using ICT in curriculum delivery?

Participant 3

For as long as we've had the smart board, which I think was just before COVID, maybe to its full potential, no. Again like I said, the smart boards just basically used for projecting whether it's notes, videos, images or those types of things. But it's not an interactive Smartboard. You know we haven't. I don't think we've advanced our children to that level of technology and exposure as such.

Researcher

How do you achieve collaboration and critical thinking when using instructional technology?

Participant 3

I think just by using technology it creates some sort of involvement amongst people, you know. Like. Especially with the learners, if that's where we're going, like the minute you put on that projector, they get excited. You know it's some. Of difference, I think it also helps when they're not hearing our voice continuously. You know, it's a bit of a break. They see it as a bit of a break. In the curriculum when it's not. Yeah, I think it just by just being creative. You know, there's so many apps and tools and puzzles and games and while still being in the curriculum that you can use to involve the kids.

Researcher

How do you feel about mobile technology use in the classroom?

Participant 3

If it's personal mobile like if the learners are asked to come in with their own cellphones, then I'm very against it,but if it's school provided. Access restricted tablets that we're giving the children, then I'm fine with that simply because of I'm a Grade 7 teacher. The children are well aware of what they can find on the Internet. They are very quick. They are very advanced and It's very hard to keep focus when I mean, you know, I could. Tell them. We're going to do research history and they'll be researching something else, so there are no controls. I think some simply for the control, if it was a restricted access device. Yes, personal devices. No.

Researcher

How did you acquire the skills to integrate technology into curriculum delivery?

Participant 3

Well, because I was given the title to do it, I've been making use of all the departmental workshops and programs that they have. I know they they're very big on like training and development sessions. It's like one every Thursday which I have been engaging work. It's very, very helpful. Very useful but it is information overload. It's a lot. A lot, especially if. like I said, I'm not the designated IT person, so I don't have the powers that be to just quickly download this and run it at my school, and I don't have the time or the powers that be. Very challenging.

Researcher

What are your perceptions of instructional devices used during teaching and learning practices?

Participant 3

I don't really have a. Perception on that, if I can be honest, I'm. Neither. Yay. Or nay. I'm a bit neutral there, sorry.

Researcher

How is technology integrated into your teaching pedagogy?

Participant 3

Very limited, I believe. I think we're on the tip of the. Iceberg. We always look at the benefit of the doubt, like give the children the benefit of the doubt, like oh, we can't do a Google Classroom because they don't have access to it at home. You know, we always creating that. And I do find that we're limited by like lots of acts and legalities. So like the Popia act and this comes into place there. So in the classroom basically is all that I use it for introducing a new topic or conversation, or very often when learners struggle with the concept then I. Revert to a video or I revert to just a different method or a different way that someone else can explain it. You know that I can find online basically.

Researcher

Tell me more about the use of instructional technology use at this school.

Participant 3

What exactly would you refer to when you say instructional technology?

Researcher Technology

Participant 3

Very limited. We have laptops at the school, so each teacher has a. Laptop and a. Smart board in their classroom interactive smart board, which is, like I said, not being used again. I think it's just used as. A projector. I can't say we don't have the resources because we have the smart board which has. Not been used. And I don't see any indication or and ambition. If I could call it in that way, I do think we're just happy with the way we have things. Whenever something new is introduced, it is very it's there's a lot of, there's a lot of resistance. Again, I'm going to say like we changed our mind-sets. We changed our reporting system to the way we send out report cards. We've moved

over to e-admin. It's been like four years now. There's still resistance as to why E-Admin. The WCED reports were working perfectly, so there's lots of resistance and mind-set changes naturally because when you move to something, the unknown comes with its setbacks and with its the negatives, I can't say it doesn't. So I think and with the resistance. That doesn't help.

Researcher

How do you perceive educated attitudes when using instructional technology ?

Novice teachers and experienced teachers.

Participant 3

Yeah, I think all novice teachers, Brilliant, Brilliant. I mean, that's what they're looking for. That's what they want. I think it. I think it forms part of their training. So when they come to school and they see these white boards and they, they get super excited about it, they're very creative about it. They really, really enjoy it. Experienced teachers is where a lot of the resistance. Come in because they know old teaching and I cannot fault them for it because it's proven to have worked. So it's not like one is right and one is wrong. That's what one knows. You know your novice teacher only knows their way around the laptop and your more experienced teacher is more pen to paper, and it's worked for both. It's worked and it's what they've known. But novice teachers do come with brilliant ideas. Brilliant, You know, you can tell fresh, enthusiastic. It's what we need in the Classroom because novice teachers are easier to relate to the learners as well. You know the learners want that interaction so. Yeah, I think. It's good

Researcher

What could be done to encourage the use of instructional technology?

Participant 3

More workshops. But simple stuff just brought just to bring it down simple, you know, just to, I must say, even the experienced teachers, because AI is so easy to use, they're loving it. They use it , they find a way to access it and to use it because they can see the benefit. It adds to them now if we can do that with. Everything or or more things. The use of technology would be so much more welcomed if they could see how it benefits them. You know when they're unable to see the connection they. Feel very threatened by it. But for a simple example like AI a lot, a lot of the experienced teachers are actually turning. So I think that's a typical example. Of how teachers are the experienced teachers actually make use of something when they can't see the benefits and it's simple, it's easy to it's like a chat. AI has now become a chat. It's you

can access it on WhatsApp, you know, so it's I think it's about the showing the accessibility and the ease of it all.

Interview Transcript: Participant 4

Researcher

What technological knowledge do you think is needed by educators to implement instructional technology in the pedagogy?

Participant 4

Well, I think. They are, they might. One could actually. Put it into two categories, the basic and, then the intermediate to advance. The basic would be your Microsoft platform, which is obviously to make the listen attractive. The second second group, which is the more intermediate to advance would be your most. Specified software, for instance using smart board technologies Mimio were more interaction with the computer, with the software. I think teachers in general need to know how to use the Internet as well. How to source something for the lesson and we have to go get certain resources. Software designed for classroom use. For instance, Google Classroom and It is a way of allowing the student and the teacher to engage, directly, but also indirectly, directly through the computer, but indirectly not being in the same venue. It also allows the learner to have the opportunity to consult without feeling ashamed in a classroom or embarrassed and allows the teacher to have the ample time to consult, because I think in classrooms today we, in general, it's overcrowded and there's not enough time to actually consult to intervene and I think that instructional technology or the software will get having knowledge of , It iIs beneficial to teachers.

Researcher

How long have you been using ICT in curriculum delivery?

Participant 4

So I've been teaching since 2021 and I've used it since day one. Until now.

Researcher

How do you achieve collaboration and critical thinking when using instructional technology?

Participant 4

So I need to know what is attractive. To the learners of what is going to get the learners excited because I. I think Education or intention to come to school needs to be that they are excited that they want to come to school because there's some sort of enjoyment and I think you're not going to remember something that was boring. You're going to remember something that was fun and enjoyable, so making sure that the lesson is enjoyable is number one that kids have are attracted to something, so I would use different sorts of games in order to consolidate what has been taught. I would say that quizzes and get group tasks together and nudging the learners by giving them, but not giving them the work, but instead directing them to maybe different sites maybe giving different sites to answer a certain question or in an assignment and for them to find the information in the site instead of me compiling it and giving it to them.

Researcher

How do you feel about mobile technology use in the classroom?

Participant 4

I'm not opposed to it, but I haven't engaged with it. I am so from that start. I would be for it, because I'm all for technology in the classroom and these. The only way you're going to see if it's going to work is if you actually implement it, and from there if it doesn't work. You obviously know. It's. It's a confined a cellphone is a confined computer. It's in your hand. You take it wherever you want to go and it's compact and If I think maybe for instance, my Google Classroom, if I have to put out a quiz on Google Classroom and get the kids to answer it within the class and it's maybe multiple select, Multiple choice question or short answered question. It's easy to get it done while still having maybe the books next to them the textbooks. It's like the calculator in mathematics being the tool on the side to supplement. So just as the calculated mathematics, so can the cellphone be used as a tool to supplement in a technological class.

Researcher

How did you acquire the skills to integrate technology into curriculum delivery?

Participant 4

Is that the rounded or short answer for that is trial and error. Personally, I've explored by even taking computers apart and in that way getting to know how the computer works. At university, we were exposed to a lot of Technology and that interaction. A part of my degree was done through blended learning. My PGCE was completely online, so in that way there was a lot of forced engagement with technology and from looking at how they delivered the curriculum of being on the receiving end and seeing

how that worked for me and how convenient and attractive that was for me. So I wanted to do that for my kids and in that way,exploring and taking the time to go through things and data? So that's the only way.

Researcher

What are your perceptions of instructional devices used during teaching and learning practices?

Participant 4

Like I said earlier, it's. It's a tool to supplement. Speaker 3

I think we are getting to a point in education where it's no longer teacher at the board delivering the curriculum, but more engaged, in the curriculum. Where the learner actually brings the idea of a certain topic and the teacher then becoming more of a facilitator so I think that's how I would perceive the use of instructional devices with teacher is facilitator and learner basically. You could say leads the lesson.

Researcher

How is technology integrated into your teaching pedagogy?

Participant 4

Everything's online my entire year. Everything that I do at the school is online so I can access it wherever I am. Kids need a slide show that I used for that. So what I do weekly is that I upload my PowerPoints of the lesson so learners who have missed the lesson can actually go on to Google Classroom and actually catch up and see. The learner is able to go back to what was covered in class on the day or in the week to devise, learners are able to access that as a database for preparing for assessments and examinations, and learners who have missed due to ill health or whatever absence. Or not left behind so. I think I don't know. I've begun the prediction. That was probably the WCED’s slogan no learner left behind at one point. Ensuring that every and with that everyone's getting the same sort of the same resources. So this equality across because, you know I teach two classes, so even though what is delivered. Through my teaching, because it's not going to be word for word in both classes. At least what was covered and the resources put out goes for all of them. We all on the same page, we move together.

Researcher

Tell me more about the use of instructional technology used at the school.

Participant 4

In general, from grade one to seven learners gain knowledge in computer, so they have computer classes. And. And I started teaching. Creates even this year I a total association life orientation during this year and that foundation was so helpful in the interaction. When I obviously I I've now obviously. Taking them to another level by having them all on Google Classroom, we e-mail each other then. The language use in an e-mail is appropriate . That really impressed me one day so. In that way, because of that foundation, learners don't struggle with interacting and being guided through an exploration of technology in grade 7,so in my subject we do, use the Google Classroom platform, and that is our base and tasks are uploaded via that if some tasks have are physical but the evidence of it is uploaded onto Google Classroom which can also be stored for a number of years. Reduces, filing space, creating filing space and it's just a click of a button. So if I need to put a portfolio together, print the evidence and put it together. From Google Classroom, we then go right into other platforms like the Great Seven Life orientation task which was devised by our district for the term 3 as the Term 3 assignment which was devised by the Central District. There are some requirements for today require I post and I then suggested to learners to use Microsoft PowerPoint or word and then learn a product and it's it. So can we use Canva? And I said if you can use Canva go ahead. And so far I've been getting submissions and. The way that they interacted with Canva is so interesting, so one has to also find out what a learner's actually busy with currently what are they interacting with? I was also alerted to, for instance WhatsApp are having or the meta platforms having. An AI check which would aid itself, for instance, if. I think AI's are different, discussed on its own, but. It would assist learners with. Getting explanations or how in a way that they would understand because they'd be able to tell the jackpot. Can you make this more relatable to me? So. Yes.

Researcher

How do you perceive educated attitudes when using instructional technology a novice teachers and an experienced teachers?

Participant 4

So I think with novice teachers you get. In my experience, two sits or or two categories. You get the young novice teacher and you get the senior in age novice teacher. The more see if I start with the more senior in age, we see that it might be a bit of challenges with wrapping their heads around technology. It might be they might have the basic knowledge of technology but the implement the the interaction with it is probably slightly slower in pace, whereas the younger novice teacher being. Connected

with instructional technology being, I think it's it's just a generational thing that will become a generation, or will they become a generation of being technologically involved so I think in that way they adapt well and they interact faster. When it comes to novice teachers, it's also engender they bring a fresh approach. So regardless of the age, they bring a fresh approach. Because they're obviously learn, they're learning new tricks that they need to use in the trade with the experienced teachers. I think for teachers that have been in the profession for so many years that. They've discovered that this is all new to them. It's slightly difficult, it's. I think it could be frustrating. Especially when you are encouraged and. Forced to to to use technology not only for educate, for for curriculum delivery, but for administration too and I think the WCED is WC's program at seats programs at TI is amazing where they offer different kinds of courses for different levels of interaction with technology and it's not only available to public school., but also independent schools. But you get experienced teachers that would be accepting and willing. And you get this the experienced teachers that would be reluctant because they've been doing it for so many years and nothing went wrong but. I think. The attitude needs to change. And I think we learned that after COVID-19 that. The attitude needs to change because if you are not going to be able to adapt. Our our main purpose for being in the profession is the child, and the child must be sent of everything and if we're not going to adapt. The child's going to suffer, unfortunately so it's important that, when we do something we thinking of the child improving. Our experience of education, because that is why we've chosen the profession? We are there to not only teach green, but also create. Upstanding and. Upsetting citizens of this country, but also citizens or young adults who can survive because that's what's called does it give you the tools to survive you just need to implement everything.

Researcher

What could be done to encourage the use of instructional technology?

Participant 4

Like I said, CTL is is a good platform to encourage. In that way that in certain, in certain certain instances they give certificates, so there's a bit of an achievement. But I think. Creating groups of people that, in especially in the school that are on the same level and you know. Learning from each other and trying to do things learn together on the go. I am. I think schools need to invest in. The different technological platforms are they which can be used to enhance. Learners experience. I am. making it accessible and accessibility comes with broadband. Having a program with learners who don't actually have devices can perhaps rented device from the school. Engagement with the private sector with regards to donations but teacher’s have to be inspired. Teachers have to

know the reason. Why? Instructional technology should be used. I think that's It's probably why teachers are reluctant to do things they don't know why they have to do it. Why do we have to change? So they need to be inspired, so being inspired, providing them with the resources. But physical and also the changing is important. Yes, bottom line. Giving them the reason why.

Interview Transcript: Participant 5

Researcher

Question one, what technical knowledge do you think is needed by educators to implement instructional technology in the pedagogy?

Participant 5

Yeah. So I think teachers need to they need to be aware of basics. They need to be able to know how to use Laptops, desktops, tablets, cell phones because all these tools are used nowadays in education lately, so if they have no knowledge of how these devices work. Are they operating? Obviously they're going to struggle to implement and to use the devices optimally.

Researcher

How long have you been using ICT in curriculum delivery?

Participant 5

I think I've been using a tool more than 20 years now. Obviously when I started in education, there wasn't as much as what is out there now, but I think over the years as time has progressed, I've made myself more knowledgeable with regards to what is out there.

Researcher

How do you achieve collaboration and critical thinking when using instructional technology?

Participant 5

I suppose it depends on the applications that is used, but generally I think that's an area where we that needs work from our side. Personally, Google Classroom at the moment I think is the space where I would say the learners collaborate because I would give them an instruction, we'd play games, we'd do quizzes. So I think there could be the area we collaboration and critical thinking comes into play.

Researcher

How do you feel about mobile technology use in the classroom?

Participant 5

I'm all for it. I think a lot of planning and preparation needs to go into making that possible because learners they catch on all kinds of things with their, with their mobile phones. So I think if it's planned. Well. I can definitely work.

Researcher

How did you acquire the skill to integrate technology into curriculum delivery?

Participant 5

I've attended loads of workshops over the year's workshops, whether they were online or whether they were in person, collaboration with colleagues, just chatting to people attending. Seminars like school, Skype. Just getting myself out there and getting to know what the products are out there that you could use in education. I think that has assisted me greatly.

Researcher

What are your perceptions of instructional devices used during teaching and learning practices?

Participant 5

I think it's the way we are moving now. Technology is very much a part of our lives and so I think it's a brilliant idea to bring these things into education. Yeah.

Researcher

How is technology integrated into your teaching?

Participant 5

So I use my laptop basically for everything I use apps like Google Classroom, I do my planning. I project corrections onto the whiteboard. We use apps like green shoots, Cami, maths. Yeah, like quite a few things that. We use used for.

Researcher

Tell me more about the use of instructional technology at this school?

Participant 5

All the teachers at the school have. They stopped in the classroom, so I'm not so lucky enough to have laptops. All the classrooms are fitted with whiteboards and projectors, and so everybody uses whiteboards, projectors and desktops to teach. We would like to improve that and possibly start off by. Purchasing tablets for the Grade 7 and then moving down on an annual basis, so we started for the sevens and then we moved down to sixes and fives and so on, but at the moment it's just a discussion. But I think we definitely need to be moving forward currently in the foundation phase, we have interactive whiteboards, some foundation phase teachers are using the Interactive White board already.

Researcher

How do you perceive educated attitudes when using instructional technology?

A novice teachers and B experienced?

Participant 5

I think novice teachers are very eager to use technology in the classroom. There's No Fear there. I think with most of them if it is a bit of fear, then I think it comes into where they got to integrate the curriculum into the use of technology. Experienced teachers, I think they are bit sceptical because this technology thing only came into play when they were quite a few years into education, but I think you know my experienced teachers out there as well who grab it and they go with the flow and they educate themselves as much as what they can in the in, in the area. So yeah, but they're mixed a mixed bag.

Researcher

What could be done to encourage the use of instructional technology?

Participant 5

I think we just need to. It's a lifelong learning thing, and so in order to be able for teachers to be able to continue using it, they need to be making themselves aware of what is out there. They need to gain knowledge with regards to anything technological, because if they know about these things then they can put it into action, they can use it.

Interview Transcript: Participant 6

Researcher

What technological knowledge do you think is needed by educators to implement instructional technology in their pedagogy?

Participant 6

Just how to manage the devices, because generally the apps and the whatever software you use, you know you kind of, you obviously need to know how to use it, but it's often more about also how to manage that I think. Because we have more than one device that you need to utilize to problem solve when things don't go when things don't work. You know because when things don't work like even that when we went inside, if they can't log on using the link, what other ways should they be able to so? I think. It's that is often for me the tricky part. Yes your schools don't have IT, guy. Go I mean, yet the woman was doing all of the coming. She's feeling good, but if she can't fix it, then we have to call. The school has to employee something and have to call him. This doesn't work and see the servers down where the network is down and schools going to have somebody on site which is also on me. Bizarre that even the district offers know like they have people that just sit with one piece. But it doesn't work. They call the IT guy. That's right there but at schools is never an IT person that can just teach, because if you teach a whole day, you don't have time to fix it. Things you know. So you need to like how to you manage that if there are devices and computers and labs, and if one person isn't in the lab all the time and you have people going in and out coming and create even more of an issue.

Researcher

How long have you been using esteemed curriculum delivery?

Participant 6

I mean, like I said, when, I think when I started teaching in 97, it was more about just doing administrative stuff at school and then the school where I was and we started making sure that classes have projectors and at least, but even they there was one projector to start with. You kind of manage that and then we slowly started building that

up so that every class had a projector but then every teacher to have their own laptop in the other school. Like so yeah, it gradually grew as also the landscape of education kind of changed.

Researcher

How do you achieve collaboration and critical thinking when using instructional technology?

Participant 6

So in terms of the projector, but when it comes to them using it for me it's more about them being able to solve a problem using the technology, I mean like you saw, so it switches on. What other things could go wrong in the circuit so that it doesn't work. So then they have to, I mean some of it is common sense, but sometimes, OK, I disconnect the light bulb or I put the light bulb in that uses more electricity. So that would be something that they could do on the collaboration for. Yeah. So those kind of things, but it's more. But if I use technology, how do I get it to create something new as opposed to just replacing the worksheet. So filling in a Google form means nothing for me and doing a Google like a quiz on Google, it's the same as giving you the test. I mean, it's not necessarily that different. So I'm not saying that it's a bad thing because that does make it quicker and more efficient, but technology shouldn't be just about replacing what you can do with a pen and a paper. It should also be about. It should be about hardware users to create something new or to do something different that I couldn't do if I didn't have the technology. That's my point with devices and ICT invasions.

Researcher

How do you feel about mobile technology using that clause?

Participant 6

So what do you mean with mobile? Here like tablets and phones. Yeah, I think that has to be managed by in primary school also by the school. I think the kids aren't mature enough to bring their own devices in and use it. And also then they aren't able to take care of the devices. For me, it's either the school has devices and you get the kids to use it. And the nice thing about this is. like I said, even. If I had six . Then I could use, I could take it out to PE so what I for instance, do like I said with PE now I use my phone, because my iPad broke, but I used to bring my iPad in, then for them, and then

go and we record them and they can see. But I only have one, you know, so they kind of have to have to manage so that everyone can use it. But if I had more, every group could have their own. And even for other activities that we do. So when we do fitness, they could use the iPad to also look at the when we do athletics, how do I, when I do that, I mean to start, what do I look like so that I can fix my stock because that's immediate. Feedback that they can get when they see me telling them doesn't always have the same effect, but when they see and also you could add little clipping and say. When you go to that station, I've written the instructions, but there's actually a visual clip of what it should look like and what you need to do, you know, and then it's useful. And again, for me, it's every learner doesn't need a device. You need enough devices so that learners could also share in work, because it's also useful to get them to work collaboratively with devices. There's enough loneliness as is. Like they all have smartphones, and then they sit and do this. The point of devices is just to make collaboration a bit easier, because also if one had to do for people as they do their dance, they could record their dance on their own. So when the next grade come in, they could share and they could link up with a group without physically being there, you know, and that is what make mobile technology a bit easier as well.

Researcher

How did you acquire the skill to integrate technology into curriculum delivery?

Participant 6

Almost states me kind of observing and learning and just seeing what's out there. And then, yeah, just kind of teaching myself, you know, so even on my iPad and I do it with more older groups. So when I work with teachers or teacher in training, the one activity for instance what I did was each group we are doing an activity. Now we have 1 device as well. So then one group. Have to do a PowerPoint presentation. This is not telling them. OK, so you could use my computer and you only have one slide and three animations. You go on there. So for the lesson you're doing, you're working on that. Another group you have a tick tok video. Another group has to do a flash mob. So every group has something different. So tik tok, video,they are the prescriptions. Then they use it to practice and make their tick tok video. So then we share together. But all of those are kind of learn by trying things out as well. So if I figure out that this is a useful thing I'm going to try that in the class and then I try and see how it works.

Researcher

What are your perceptions of instructional devices used during teaching and learning practices?

Participant 6

it makes a lot of the stuff just easier because you don't always have to print? You don't always it's immediate. So that's what makes it so. It means a cut down on all of the kind of like even when you have to hand things out like I have to hand it out and then I have to where you click like when I show them the simulation, you can immediately click and they go and if they have the device that's a bit more immediate. In the lesson you could most probably get a bit more done. Then what you would otherwise, when you constantly have to cut them not and they need at primary school again, those skills are also important because the cutting and the gluing has gross motor skills that they need anyway. So you need to have a good blend of those two things together because how they going to cut their vegetables and they can't even cut the piece of paper. You know. So I think that's also important, but it's about, I think blaming it on the legacy. For me, it's if I can do it with a textbook and then, but then it doesn't necessarily, it does. It doesn't become as meaningful as what it would have been if it gets the kids to create or do something that they wouldn't be able to dousing pen and paper.

Researcher

How is technology integrated into your teaching pedagogy.

Participant 6

So yeah, so like I said, I'd use it. Where I can? For me, on a daily basis, I just when I do, when they come in, I'll have a PowerPoint with explanations and things and either they have video clips or things in there. So what the cranes, what do they do? We explain some of the parts. Then there'll be a little video. Then there will be explanations and then they leave the sector with it. So then it's easy for me to put the instructions of the activity up. You're going to do that, then you're going do that, and then we then need to mark, there's another video that explains so they can check, and then you Mark activities and then each of the labels come up as we go and we talk about it. And then we explain again about, OK, So what does this look like as electromagnetic crane? So that's how I use it because we can move from them working to me, working to me, showing and even the video clips, I'll play something and I'll stop it and we'll ask a question. What did you see? What do you notice? What's different between that and what you have in your book? So it allows me to move between things and it also allows. When I say now you're going to do something individually, then off they go and they do it individually and I can have an example on the board for them for instance.

Researcher

Tell me more about the use of instructional technology at this school.

Participant 6

Yeah. So I mean every class we have business computer and in the classroom there's Internet and the Wi-Fi works pretty well. So that makes it useful and we have one lab and like I now because she. I have those two lessons. Generally only wins that so the lesson that I just had the computer lab would be free. And then so what I did was because I knew I had the two classes, I went to her and I said, listen, you have it free. I need to bring them to the lab when I can. So like I said, the one day it will be the one group. So if I have two lessons to teach. They will get one lesson day and that group will get the same lesson only the next day, but generally they'll get the same lesson off each other and they have to. Take them to the. So I use the computer lab where I can with the great savings with the other PSW. I call because there's always classes in me, and then my time. That's what you really like. I said. I don't like to put things on Google closely because I know they're gonna have to do with going to get home because they don't have access. They can go there, but they do, Cami. And green shoots and when they go home, Mommy and Daddy is going to sit and just do this and do this now. And that's pointless. You must be able to do the things yourself. I can’t guide Mommy the moment that goes on, Mommy and Daddy is just going to do it, so I don't put things on Google Classroom for them.

Researcher

How do you perceive educator attitudes when using instructional technology, a novice teachers and B experience teachers

Participant 6

What I I mean because I supervise some student teachers. One, I often find that the use of instructional technology will often just be it will be their direct application often. So they use the PowerPoint to deliver a lesson and even when they use the PowerPoint. So for instance, they will, even the students that I supervise never do this. Like add things and talk. They will have everything on the slide when it comes up. So I constantly have to say to them when you have all of it up, what's the point because you can't really ask the question the question. So I can ask them before the time, OK. So what do you see here at the bottom and we talk about it so that they get to think about what they see before me just because it's all there while they can read it, the name, what's the point?I mean, we saw when we spoke about the crane, so we spoke about this yesterday to every other lesson. I wouldn't say. So what could those two clans do from yesterday? So now I have to think. I saw that in the clip and I saw that. Why didn't do, I mean, I saw them. I showed them the one with the wheels. So then they know that some cranes can move. So this clip then they know, oh, this game, the arm can move,

but this crane can also move. So they have a visual of it from the day before. So I find that it's often just a direct reputation and it's also. Because most schools even I mean at Curro where they are for students that I supervise in Century City, every classroom as protectors of the kids to Ms. teams. But in the classroom, there's never. OK, so this is activity on Ms. teams. And I I suppose they could do the flip class an easy way, they say to the. It's OK, I'm going to put the video on. Then I want you to watch at home when you come back to the close. This is what we're going to do with the video. But what happens even in those circumstances I find is that it's just that that so that I'm going to put this on in this scheme for you. So they just this goes on to any scheme, so you don't. But like so, how was that different to them having the textbook? You know? How is it different? So if they're going to do things again, what do you do there that is different that you couldn't do without them? So I think it's it's just a direct move from the one to the other without any kind of thinking about meaningful. Engagement with the technology to create something new or do something different, and also because it's easier to do it in this way. You know, it's just maybe part of the teaching. Way of seeing teaching that this is what people does. Like for me, it's. All evidence of learning can't be in the book either, but because the reporting the so and I mean my thesis is about this whole idea of our teachers are being surveilled and monitored to have evidence of what they do. But evidence of learning isn't necessarily the book or what doesn't. I want to see all of the worksheets in the book, so teachers revert back to that immediately. Even new teachers that have lots of ideas, that's where they go because I need to show you evidence of learning. But evidence of learning is also what we spoke about yesterday and. I can't write down everything that we. Speak about. It's also about what I know and what I've experienced to create something new, which is not what. Learning as necessarily monitored to be as if that makes sense.

Researcher experienced teachers.

Participant 6

I think experienced teachers, the older they are, the less likely they are to use technology because it takes a lot of getting used to, so they don't necessarily think of different ways of using the the technology. Because they think that they must do everything that's hip out there. Everything that's out there is not educational. It doesn't serve an educational purpose necessarily. So like I said, I can say you, you stick talks about now I'm going to ask you to make a tick tock video to get people to say we're doing kindness. Your group will do a. Tik tok video. To encourage people to be kind. So that's what it will be about and I can download the app on my phone and give you the device. Your group will do a. Flash mob so. You're going to have to think about when it's your turn to present. Where do we position everyone in the class? And I say this

and you say this and you say this and you know those kind of things. So I think experienced teachers will revert back to. So there will be less could be biased, but they're less likely to. Again, it's about. Them thinking I have to replicate what I can do in the textbook. As opposed to how do I use and you don't? For me, it's like you don't have to know everything about everything in terms of technological use. Use what you can use at that time and make it works. Because if it's not meaningful for the kids, it's not going to be then learning nothing from it, if that makes sense.

Researcher

What could be done to encourage the use of instructional technology?

Participant 6

Some schools need better infrastructure. You can't ask people to implement all of these things when there isn't enough, when. There are no electricity or the Wi -Fi. I mean the school pays for the Wi-Fi. That's why we have our Wi-Fi. But you know, in most schools, WCED's network don't work. You can't have everyone log on to them because it does. So there has to be. You can't want to say we must do this, but there's no infrastructure to get this going. You need infrastructure and you need proper equipment. Don't give the cheapest of cheap things to schools because they don't work. So again, you can't want to go to the Olympics and but you've never run on the track. I mean, it makes no sense. That will cost money, but maybe they'll spend the money on the things that will work as opposed to spending money on all sorts of other nonsense that they kind of think up for people to do. Like I say, every kid doesn't need a device, but there needs to be devices. Then enable learning in the classroom throughout the day. You can't have all the devices in one space and expect the whole school to effectively use it, because don't tell me they use it effectively, they don't. I mean, if you if they old school, use it. They only get an hour a week in the lab. What you gonna do in an hour when you have to do green shoots and you want people to? Do other things it. Just. Doesn't work, so move the devices from the like I say into this one, even if every class has six device. Yes, they can do the green shoots in their class within during the week, but they can also do the geography on there. They can do history, they can do English on there, they can make a video for the other on there. They can do all of this because they have six devices in their classroom for the entire week. You know what I mean? So if you think about that now we have. So it means that immediately while the. Course I'll play at the beginning, maybe slightly more, but now it means that everyone. Can do more. Over a long term period as well. You know what? I mean. So yeah.

Appendix I

Journal Transcript: Participant 1

Reflective Journal Participant 1

1. When you started teaching did you feel confident using instructional technology?

Yes, fortunately while studying at UWC we had a module library science. This helps me to aid my lessons better.

2. How did you overcome the barriers when using instructional technology?

I empowered myself by attending short courses to help me. I am also not afraid to ask someone that knows a little more for assistance. Covid also forced me to overcome some barriers.

3. What were the barriers that you overcame?

Our school was forced to more digital due to Covid . We then implemented Google classroom which I had no idea how to work, but had to use this platform so I was forced to educate myself with this platform.

4. What is your current experience when using instructional technology?

Learners are more engaging when they see things. Technology has helped me bring my lesson to life and so much more creative.

5. Who do you perceive as being responsible for encouraging the use of instructional technology when delivering the curriculum?

The WCED should empower the educators more with technology. All educators should be sent for training to help us get familiar with the latest technology and Apps as things change.

6. How did the impact of instructional technology change the following aspects in learners?

a) Collaboration

b) Creativity

c) Critical thinking

d) Communication

Instructional technology has provided learners with various tools and platforms to collaborate with their peers and individuals. This also opened new avenues for learners to express themselves with their creativity with access to multimedia. Overall instructional technology has positively impacted learners by promoting collaboration and enhancing creativity.

Journal Transcript: Participant 2

1. When you started teaching did you feel confident using instructional technology?

Teaching at x primary allowed me to bring technology into curriculum delivery because the resources available. I could apply my ICDL skills obtained in 2007 (International Computer Driver's License), Learning participation was guaranteed.

2. How did you overcome the barriers when using instructional technology?

In 2008 I did a Mispil Course funded by the department which allowed me to up my skills. I also had the opportunity to attend a Mimio Interactive White Board Course. (2008)

3. What were the barriers that you overcame?

The confidence in using digital technology, learners are advances in using technology because they are exposed at home. Using the technology may consume your actual delivery.

4. What is your current experience when using instructional technology?

I mostly use it when engaging with colleagues to do:

• Presentation

• Helping individual colleagues especially support staff

• Teach our learners how to use devices safely

5. Who do you perceive as being responsible for encouraging the use of instructional technology when delivering the curriculum?

Anybody tech savvy, who is diplomatic and patient.

Someone with tact as colleagues is apprehensive when it comes from management especially the principal.

Older colleagues are embarrassed about their skill level.

6. How did the impact of instructional technology change the following aspects in learners?

a) Collaboration

b) Creativity

c) Critical thinking

d) Communication

The usual stimulation gives them a better understanding of something that was abstract. It forces them to anticipate and read between the lines better. Learners share more freely. They become aware of certain etiquette and how to enhance projects they must complete.

Journal Transcript: Participant 3

1. When you started teaching did you feel confident using instructional technology?

Yes. I have always been very confident when using technology in the classroom. I feel like it allows me to offer so much more to the learners. It allows for more involvement and interaction from the learners.

2. How did you overcome the barriers when using instructional technology?

Provide more awareness/training/workshops/

Self-awareness

As the schools IT champion, I had the responsibility to provide training to the rest of the staff.

They were initially very resistant and it took a lot of convincing.

3. What were the barriers that you overcame?

Full staff involvement.

4. What is your current experience when using instructional technology?

Can certainly be enhanced and improved.

SA schools are far behind in using technology.

5. Who do you perceive as being responsible for encouraging the use of instructional technology when delivering the curriculum?

6. How did the impact of instructional technology change the following aspects in learners?

a) Collaboration

b) Creativity

c) Critical thinking

d) Communication

Collaboration - Learners are much more involved in the lessons.

Creativity - Includes all learners and captures attention.

Communication – Learners feel free to participate.

Journal Transcript: Participant 4

1. When you started teaching did you feel confident using instructional technology?

Yes

2. How did you overcome the barriers when using instructional technology?

As a school, we invested in solar energy which enable us to have uninterrupted supply of electricity during the loadshedding crisis. Internet has become more accessible with more WIFI hubs available and an efficient internet speed.

An innovation committee was formed to address new technological innovations which can be implemented in our classrooms but also as an opportunity to engage with other colleagues to find out what they are using different to you.

3. What were the barriers that you overcame?

Load shedding Connectivity Issues – outages, poor speed, and insufficient access.

4. What is your current experience when using instructional technology?

• Resources easily accessible

• Reduction of marking with self- marked puzzles

• Platform to provide learners with additional information/resources

• Unable to explore further possibilities when learners are not provided /able to bring devices to school and used in a lesson.

5. Who do you perceive as being responsible for encouraging the use of instructional technology when delivering the curriculum?

In schools, principals and HOD's who have to both inspire and set the example.

6. How did the impact of instructional technology change the following aspects in learners?

a) Collaboration

b) Creativity

c) Critical thinking

d) Communication

Collaboration – Chat rooms enable learner discussion especially when uncertain about work Creativity – Creative possibilities with digital tools, e.g. Sourcing images from google vs magazines/newspapers Critical thinking – Using games to revise lesson/s covered Communication – Learners are able to engage with teacher directly, feeling ashamed. Ability to do intervention

Journal Transcript: Participant 5

1. When you started teaching did you feel confident using instructional technology?

I was definitely not as confident as I am now. We did not have computers in our classrooms back then, we only had one computer in the staffroom which everyone had to use.

As time progressed, we were lucky enough to have a TV and DVD player which we could use to show the learners educational material.

We eventually all received desktops in our classrooms and later projectors and whiteboards were installed. Regular use of these tools led to growth in confidence and the need to learn more about the capabilities they have.

2. How did you overcome the barriers when using instructional technology?

I attended workshops and spoke to colleagues who were confident and trained in this area. Our head of IT was very knowledgeable and was always willing to assist with any issues we had.

3. What were the barriers that you overcame?

The main barrier for me was time constraints, raising a family and finding the time to plan, implement and troubleshoot technology was challenging.

4. What is your current experience when using instructional technology?

I think that I have grown in leaps and bounds in this area, but since this is an ever-changing terrain, one has to try and remain abreast of all the new developments and implement what you can in order for learners to have an enriching experience.

I enjoy using technology on all levels from my cellphone to my iPad and laptop. I still feel that I need to do so much more.

Currently I use my laptop and projector for google classroom, You tube clips, AI – ChatGPT, green shoots, Cami, Kahoot. Learners do research, create PowerPoints, use apps such as paint and publisher. I communicate with parents via email.

5. Who do you perceive as being responsible for encouraging the use of instructional technology when delivering the curriculum?

I think there are a few role-players here:

• D B E

• WCED

• District Offices

• Principals

• SMT's

Encouraging one thing but providing the infrastructure which many schools still don't have is another.

6. How did the impact of instructional technology change the following aspects in learners?

a) Collaboration

b) Creativity

c) Critical thinking

d) Communication

Online forums allow learners to work together from any location, thus sharing ideas (Collaboration)

Advanced tools and apps can inspire and facilitate creative thinking – Simulations, virtual reality, interactive software and games require critical thinking in order for problems to be solved.

Technology supports various forms of communication including text, audio, video. Helps with expression and catering for learners different learning styles. It connects learners with resources from all over the world, thus broadening their perspectives. Social media also allows opportunities for engagement and participation in conversations beyond the classroom.

Journal Transcript: Participant 6

1. When you started teaching did you feel confident using instructional technology?

1997 – None or very little knowledge or resources available. Poor school technology infrastructure at the time. Mostly admin and worksheets were done using computers.

• letters to parents

• mark sheets and lesson plans

• Worksheets

• School planning

2. How did you overcome the barriers when using instructional technology?

• Used my own devices and software when and where possible.

• Self-taught

• Bought own devices

• Started a school resource plan in conjunction with a forward thinking principal at the time

3. What were the barriers that you overcame?

• Lack of resources / facilities

• Poor internet

• Poor stability of electricity network

• Maintenance of equipment

4. What is your current experience when using instructional technology?

Fairly Good.

Use my own devices to make classroom and learning experience better for learners. I believe in use of technology to enhance rather than duplicate what is already in textbooks and workbooks. Use devices to mirror students work in class for everyone to see. Learners access computers in lab to use online simulations. Use devices in DE to record earners movements so that they can evaluate own progress. Use devices for revision (plickers)

5. Who do you perceive as being responsible for encouraging the use of instructional technology when delivering the curriculum?

• School - Be innovative

• District -

Must supply sufficient and usable resources and equipment

Resources to assist with maintenance

• Principal – support teachers who are willing to be creative and innovative.

6. How did the impact of instructional technology change the following aspects in learners?

a) Collaboration

b) Creativity

c) Critical thinking

d) Communication

a) They encourage and provide feedback to improves outcomes

b) Think of different ideas and see new possibilities

c) Ask new questions