



**DIGITAL TRANSFORMATION IN THE BASIC EDUCATION SECTOR: A CASE
STUDY OF SELECTED DISADVANTAGED SCHOOLS IN THE WESTERN CAPE**

by

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degree**

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DECLARATION

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ABSTRACT

Information and communication technology (ICT) use in education has grown significantly in recent years thanks to the development of new technologies. ICT developments have been claimed to be advantageous for learners in Township and rural schools. However, because insufficient focus has been placed on the variables influencing the implementation of digital transformation in these townships and rural schools, ICT inequalities still exist and have an impact on townships and rural schools. This study's goal is to examine how digital change has affected the Western Cape's underprivileged schools' basic education system and to determine the adequacy of the ICT infrastructure that will aid the use of digital transformation tools in the schools. This study adopted a mixed-methods research approach, which allowed the researcher to combine both inductive and deductive thinking to address the identified research problem. A survey research design was found to be suitable for this study, as surveys can use open-ended and closed-ended questionnaires. The target population comprised 16 educators (teachers and principals) and learners in four high schools in Khayelitsha Township, Metro East District, Western Cape. Non-probability sampling methods of purposive and convenient sampling were used to select the participants. The collected data were entered into an MS Excel spreadsheet for further qualitative and descriptive analysis. Digital transformation programs have not been well implemented in Khayelitsha Township, as most educators and learners provided evidence of how they are struggling in terms of their implementation. The biggest challenge highlighted by most respondents was the unavailability of ICT tools and services, which therefore affects the implementation of digital transformation programs. Most educators, however, received training from various ICT government programs and revealed their readiness to use ICT in their schools to improve service delivery and keep up with the technological transformations in the education sector. Teachers' attitudes towards technology largely depend on the use of ICT in educational settings. This study reveals that parents do not do enough to support ICT implementation in schools as they do not prioritise ICT tools. The government of South Africa should invest in the necessary infrastructure to support the implementation of digital transformation and enhance digital access for disadvantaged communities. Parents should also support digital transformation by prioritising the use of

smartphones and laptops they purchase for their children. This research is vital as it gives an insight into how marginalised schools continue to be isolated from development in South Africa.

Keywords:

Digital transformation, Digital technology, Educators, Information and communication technology, Learners, Learning, Marginalised, Teachers, Township.

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DEDICATION

In loving memory of my late grandmother Nomatshaka Euphen, both my parents, my dearest father Mxolisi James Tshele and my mom Nokuphumla Pearl Cwala, and my siblings Xhanti Cwala and Songo Tshele. You always kept your faith, believed in me, and supported me all these years. I am eternally grateful; without you, there would be no me.

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ABBREVIATIONS AND ACRONYMS

CHE:	Council on Higher Education
CPUT:	Cape Peninsula University of Technology
CSCL:	Computer-Supported Collaborative Learning
DHET:	Department of Higher Education and Training
EMDC:	Emerging Markets and Developing Countries
FNME:	Finnish National Matriculation Examination Board
HESA:	Higher Education South Africa
HOD:	Head of department
ISCED:	International Standard Classification of Education
KCSE:	Kenyan Certificate of Secondary Education
KNEC:	Kenya National Examination Council
LMS:	Learning Management Systems
GBE:	Global Basic Education
SGB:	School Governing Bodies
SACE:	South African Council for Educators
SACMEQ:	Southern and East African Consortium for Monitoring Educational Quality
SGD:	Sustainable Development Goals
STEM:	Science Technology Engineering Maths
NECT:	National Education Collaboration Trust
WEF:	World Economic Forum

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CHAPTER 1

INTRODUCTION

1.1 Background

There is a perception that the basic education system in South Africa does not conform to change quickly, despite the challenges of efficiency and productivity it faces (Pea-López, 2016). Integrating digital technology with the basic education system as an implementation tool drives educational reform by transforming teachers' practices and achieving efficient digital learning (Mhlanga & Moloji, 2020:2). Digital technology has become an integral part of society, where the young and old grow and learn (Tamim et al., 2015). Schools and education systems have to gain from the advantage; digital transformation in the education system sector has brought digital fairness to education, which means that all learners have ready access to educational resources that are more affordable than outdated ones (Vitus, 2022:2). Digital transformation has helped schools, learners, and teachers be well-informed about the constant flow of novel technology and manage the changes and distractions this new technology has brought (Duma et al., 2021:2; Vitus, 2022:1). Digital transformation includes using new digital technology that depends on the Internet, such as open-source learning management systems and educational resource sites, to transform and innovate the education sector (Iivari, Sharma, & Ventä-Olkkonen, 2020:7; Imran et al., 2021:452).

Despite this, digital transformation in the education sector is a highly contentious issue, as there are perceptions that teachers are enormously resistant to the transformation and innovation it has brought to the sector (Pea-López, 2016). According to Pea-López (2016), a survey conducted depicts the misconception that teachers are resistant to digital transformation. The misconceptions are based on teachers' ideas or views, indicating that many changes are imposed on them without considerate consultations or preconditions for the successful implementation of this transformation and the underlying issues the government and public sectors have solved.

1.2 Problem statement

In the global world, the rapid change towards digital education cannot be overlooked, and South Africa is not an exception (Vitus, 2022:1). In response to the rapid shift towards digital learning, the Department of Communications and Digital Technologies (DCDT) came up with the National Digital and Future Skills Strategy (NDFSS), which addresses the need to foster digital skills development throughout the country in the categories of all the education stages (Vitus, 2022:4). The government of South Africa also developed the National Development Plan, which made commitments to ICTs (Mkhize & Davids, 2021:21). Besides the national policies, South Africa subscribes to the United Nations' Sustainable Development Goals (SDGs) and Agenda 2063 of the African Union (2015), which all highlight access to ICTs as important for human development (Mkhize & Davids, 2021:21). Unfortunately, despite the adoption of national policies and international treaties, including a democratic constitution, the implementation of ICTs in South Africa generally remains unfulfilled, particularly in schools located in marginalised and rural areas (Vitus, 2022:4). This digital divide makes South Africa one of the most unequal societies globally (Gore & Botha, 2022:238). Schools in poor and marginalised communities continue to be excluded from digital advancements compared to schools in urban areas (Mkhize & Davids, 2021:21; Lin et al., 2023:48). The digital imbalances between urban and rural areas are becoming one of the key factors resulting in educational inequality, as reflected in the national pass rates between rural and urban schools (Blank, Graham, & Calvino, 2018: 82; Jackman, Gentile, & Cho, 2021:542). Despite this being an important issue to investigate in South Africa, literature on the adoption of ICTs by rural and marginalised schools is generally lacking, particularly in the Western Cape. This study therefore aims to examine the adoption of digital transformation in disadvantaged schools in the Western Cape.

1.3 Rationale and Significance of the study

This study is relevant as it contributes to the National Development and Sustainable Development Plan's inclusiveness and equality goals, which ensure everyone gains equal access to reasonable, quality basic education and promotes continuous learning opportunities. In addition, this study is vital to the Basic Education Department in the

Western Cape, the body responsible for primary and secondary education; this will give the department insight into how vital digital transformation tools are in individual and collective learning processes in Western Cape schools. This will further aid some of the government initiatives and plans for equal access to education by providing insight into the underlying issues and challenges still faced by the basic education systems and how they can implement additional policies to reform and reshape the basic education system.

1.4 Aim and objectives of research

1.4.1 Aim of research

The study aims to examine the adoption of digital transformation in disadvantaged schools in the Western Cape Province. The objectives presented in 1.4.2 will guide this study:

1.4.2 Objectives

- to determine the adequacy of the IT infrastructure that will aid the use of digital transformation tools in the schools;
- to investigate the effect of digital transformation on learners' learning experiences in schools;
- to analyse the digital reformation and transformation of teachers' practice in schools;
- to determine teachers' skill levels in the schools and use the digital transformation tools to reform the education system.

1.5 Research Questions

Based on the research aim of the study, the following research questions guide the project:

- How adequate is the IT infrastructure to aid the use of digital transformation tools in schools?
- What is the effect of digital transformation on the learning experience of learners in schools?

- How can digital reformation and transformation influence teachers' practice in schools?
- What skill level do teachers need to use digital transformation tools to reform the education system?

1.6 Research Propositions

- The IT infrastructure is adequate to aid the use of digital transformation tools in schools.
- Digital transformation has a positive effect on the learning experience of learners in schools.
- Digital reformation and transformation positively influence teachers' practice in schools.
- Teachers have the skills needed to use digital transformation tools to reform the education system.

1.7 Overview of the Literature Review

Digital business and digital transformation are currently popular slogans that generate excessive interest and are used in many situations. It is possible to identify some digital transformation classifications in the literature, specifically from IT service and solutions providers such as Gartner, Cisco, IDC, and others. While some definitions concentrate mainly on connecting technologies to improve or develop the business. Wade (2015:68) and Solis & Szymanski (2016:2) state that for others, the digital transformation is the process of digitizing and making obtainable what was previously analogue or physical (Raab & Griffin-Cryan, 2011:27; Alkan & Kahraman, 2022:24). Regardless of how it is defined, digital transformation is gradually regarded as an imperative and has compelled organisations to consider how they can use technology to enhance their performance or grow their businesses.

1.8 Overview of the Research Methodology

This study employed a mixed-methods research methodology, which enabled the researcher to handle the research topic by combining inductive and deductive reasoning.

A survey research design was found to be suitable for this study, as surveys can use qualitative research approaches (using open-ended interviews), quantitative research strategies (using questionnaires with dichotomous responses), or both strategies (mixed methods). The target population consisted of educators and learners in four Khayelitsha Township high schools that were purposefully selected based on the inclusion criteria of the schools being economically disadvantaged. Sixteen educators (principals and teachers) and 16 learners were purposefully and conveniently selected to participate in the study. The self-administered survey approach was used to collect data from the educators using an open-ended questionnaire, and open-ended and closed-ended questionnaires were administered by the researcher to the learners. The data were entered into an MS Excel spreadsheet for further qualitative and descriptive analysis.

1.9 Overview of Ethical considerations

The Faculty of Business and Management Sciences at Cape Peninsula University gave ethical approval. The following ethical protocols were considered:

Informed consent

The topic of this study was explained to the study's participants, and consent to their participation was obtained. However, to maintain the legitimacy of the study, informed consent has stated that participants may refuse to participate and withdraw at any time.

Confidentiality

Participants' information will be protected by providing them with the option to remain anonymous or reflect on their details.

Participant's right to privacy

The participant's privacy will be prioritized and will comply with the participant's freedom of choice to participate. Measures will be taken to ensure the participants are not harmed by participating in the study by obtaining informed consent. Participants were informed of their right to remain anonymous, clearly explaining the research study's objectives and affording them the right to withdraw from the study at their discretion whenever they so wished.

1.10 Structure of the thesis

The remaining chapters of this thesis are:

Chapter 2: Literature review. This chapter looks at a broad review of literature relevant to the research study.

Chapter 3: Research Approach and Methodology. This chapter will present the research process, methodology, and data analysis tools utilised in this study.

Chapter 4: Results and discussion. This chapter will present the results and discuss the findings.

Chapter 5: Conclusions and recommendations. The last chapter of the research study will provide conclusions and recommendations.

1.11 Chapter summary

This chapter serves as the introduction to the study, outlining the backdrop to the research problem and the thesis statement that motivated this study. The research problem identified is the issue of marginalised schools in South Africa that are lagging behind in terms of integrating ICT tools into their classroom activities. This is of concern as the global world is going digital, and the marginalised will continue to be isolated from these technological developments. To investigate this research problem in Khayelitsha Township schools, the research objectives, research questions, and propositions were presented. The chapter further provides the rationale of the study as well as an overview of the research literature review and research methodology. The next chapter conducts a literature study to investigate the theoretical foundations for this research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The previous chapter introduced the research report, covering the context of the research from the perspective of the significance of the research, the research problem statement, the research aim, objectives, and questions. This chapter discusses the underpinnings of the scholarly work conducted in similar settings that are relevant in expounding on the phenomenon's existence, how it came about, and why it is still a problem that needs to be addressed to benefit society. This chapter covers scholarly works in digital transformation, basic education globally on the African continent and in South Africa, and digital technology for education in terms of digital technology for teaching and learning and basic education.

2.2 General perspective of digital transformation

Digital business and digital transformation are currently popular slogans that generate great interest and are used in different contexts. Therefore, it is likely to identify some digital transformation classifications in the literature, specifically from IT service and solutions providers such as Gartner, Cisco, and IDC. While some descriptions concentrate principally on connecting technologies to improve or develop the business (Wade, 2015:68; Solis & Szymanski, 2016:2), for others, digital transformation is the process of digitizing and making accessible what was previously analog (Raab & Griffin-Cryan, 2011:20).

Imran et al. (2021:451) defined digital transformation as a change in how work is organised and is driven by developing business models through digital technology. It also comprises the implementation of a technological solution; it requires the synchronisation of organisational, human, and digital factors. Digital technologies, according to Mahlow and Hediger (2019:7), are employed profoundly and purposefully to generate new capabilities and models via digital transformation. Whatever its definition, digital

transformation is increasingly becoming recognized as a necessity and has helped organisations think about how they can use technology to grow their businesses or improve performance.

Digital transformation includes a great deal of change that affects structures, policies, processes, and people in a competitive environment (Wade, 2015:68). IT plays two distinct roles in the digital transformation process: IT acts as the operational foundation for the primary business functions. IT is used to provide a platform for digital services that makes it easier for digital innovations to be developed quickly and implemented. Moreover, organisational structures, managerial perspectives, and business goals frequently change due to digital transformation. A digital transformation strategy that "cuts across existing corporate strategies and facilitates the coordination, prioritising, operation, and governance of transformations owing to new technology" is what organisations need to develop.

"Digital transformation," according to Wade (2015:69), is the cultural, organisational, and operational transformation of a business enterprise, industry, or eco-system through the smart strategic integration of digital technologies, processes, and competencies at all levels of the organisation to produce improvement and advance new development. Additionally, according to Nadkarni & Prügl (2021:233), "digital transformation" is an actor-driven organisational transformation brought on by adopting digital disturbances driven by technology. They claimed that transformative leadership, organisational and management skills, the work environment, and business culture are all components of actor-driven transformation. Therefore, organisations must now undergo digital transformation.

Additionally, the activities of digital transformations have given rise to concepts like "digital economy" and "digitalisation" (Bharadwaj et al., 2013; Westerman, Bonnet, & McAfee, 2014:2; Nwaiwu, 2018:86; Heavin & Power, 2018:38; Ejemeyowwi & Osabuohien, 2020:48). Digital transformation extends beyond digitalisation, which is the modification of specific organisational activities and procedures, and affects the entire organisation

and its methods of conducting business (Ejemeyovwi, Osabuohien, & Bowale, 2021:16). It changes a company's business model or value-generating process by rearranging its procedures (Bharadwaj et al., 2013). Therefore, the relationship between digital transformation and strategic changes in the education model resulted from using digital technologies during the learning process (Ejemeyovwi & Osabuohien, 2020:49).

Both researchers and business experts have recently demonstrated a greater interest in finding a way to successfully implement digital transformation. However, businesses do not have enough frameworks and tactics to negotiate such profound shifts. Berman et al. (2016:21) expanded on the factors that make the digital transformation successful, arguing that an organisation must adopt new strategic goals, develop new knowledge, and establish new work practices in order to be successful. To accomplish effective transformation, he also emphasizes the need for bottom-up innovation in strategy, operations, and technology. Berman et al. (2016:22) advanced the Digital Reinvention Framework based on these considerations.

2.3 Theoretical Framework

Understanding phenomena of interest requires the use of theoretical models (Fried, 2020:306). Theory-based research shifts emphasis away from the superficial focus on removing issues and results and toward a wider and deeper investigation of structures and processes, serving as a foundation for future research (Bethel et al., 2022). There are many theories within digital education, and the frameworks connected to this research presented in this section evolve around technology acceptance and resource mobilisation. The theories are all highly connected to the aim of investigating the adoption of ICTs in marginalised and rural schools in the Western Cape Province.

2.3.1 Technology Acceptance Model (TAM)

Emerging digital technologies drive the implementation of new technologies (Verhoef et al., 2021). ICT advances have dramatically changed the way in which various organisations conduct their businesses. Applying new technologies in the workplace has redefined intra- and inter-organisational communication and streamlined business

processes to ensure maximum benefits, for example, higher productivity, employee wellbeing, and the satisfaction of customers (Papagiannidis & Marikyan, 2020:2). In order to achieve these benefits, institutions ought to spend massively on technologies. Investment in ICT implementation does not, however, guarantee successful deployment, and high returns are not guaranteed.

In this regard, the TAM was thus proposed by Davis (1989), and it explains and predicts user acceptance of technology. Technology acceptance is considered the major factor for this study because, according to Davis (1989)'s suggestion, perceived ease of use (PEOU) has indirect effects on ICT usage through what is termed "perceived usefulness" (PU). Further to this, teachers' and learners' attitudes toward the adoption of ICTs are strongly correlated with their acceptance of using the platforms (Shih, 2004). The PEOU and PU significantly determine the attitude of the teachers and learners towards ICTs.

2.3.2 Digital Resource Mobilisation Theory (DRMT)

Understanding phenomena of interest requires the use of theoretical models (Fried, 2020:306). Theory-based research shifts emphasis away from the superficial focus on removing issues and results and toward a wider and deeper investigation of structures and processes, serving as a foundation for future research (Bethel et al., 2022).

2.4 Overview of Basic Education

Society is rapidly changing. Perhaps more than other aspects of our societies, education is affected by the shift to a digital era. The digitalisation of education has not been at the forefront. Learners will typically meet new technologies outside of the classroom, despite the fact that access to ICT infrastructure in schools is widespread in OECD nations (OECD, 2019:179). According to recent OECD research, there has been a moderate amount of innovation in primary and secondary educational practices, which has mostly manifested itself in an expanded use of technology in educational settings (Vincent-Lancrin et al., 2019:17). The coronavirus epidemic, however, has highlighted how limited While many contend that economics plays the most significant role in forming a nation, education has a much greater influence. The first stage of basic education is called primary education, and the second stage is called secondary education, according to the

International Standard Classification of Education (ISCED) standard (second stage of basic education). Furthermore, it encompasses a broad selection of private and public activities fundamental to meeting the basic cultural needs of people of all ages, which can be non-formal or informal.

Many historically disadvantaged South African Township schools have learned that implementing educational reforms is more challenging than in urban schools and that keeping up with such obstacles is tough (Msila, 2010:169). This contributes to the idea that South African townships are underfunded and marginalised. By decentralising education to local communities, the South African Schools Act, often known as the Schools Act, provided a fresh viewpoint on the subject of township schools.

In order to ensure that children get a high-quality education, the Schools Act mandates school governing bodies (SGBs) to implement effective and efficient governance. The SGB is made up of the administration of the secondary school, teachers, support employees, parents, and learners. SGB members should acquire a diverse set of skills, abilities, and knowledge in order to cope with the complicated financial challenges and responsibilities that come with decentralised school governance and administration. Township schools are generally governed by people who lack the knowledge and skills required to manage schools properly (du Plessis & Mestry, 2019:112). Township public schools are classified based on a variety of issues that have a detrimental influence on the delivery of high-quality teaching. Townships are usually underdeveloped and difficult to reach. As a consequence, many schools are lacking in basic supplies and infrastructure for sanitation, water supply, transportation, electricity, and information and communication technology (Mulford & Johns, 2004:45).

The socio-economic disadvantage faced by parents in rural areas hinders learning. Budget restrictions hinder provincial governments from providing the financial support needed by remote schools to help guarantee that learners get a high-quality basic education. Parents are under a lot of strain because they have to purchase stationery and cleaning materials for their children since educational authorities are unable to provide

schools with critical physical and human resources.

Most parents in South Africa's rural areas have low-wage jobs, have little education, and do not value education in general. Because they are unable to pay for necessary extras, these parents have a detrimental influence on both learning and teaching at these institutions. According to the South African Schools Act, the Republic of South Africa's 1996 Constitution, and related laws and policies on equality, every South African student should have access to learning and instruction, comparable facilities, and equal educational opportunities. Unfortunately, this is not the case. Instructors' obligations and the quality of instruction provided to learners in these circumstances are directly impacted by poverty and unemployment, which result in the problems mentioned above.

Most of the time, instructors in township schools are forced to teach in full classrooms due to a lack of resources and overcrowding (influx), where they are forced to teach courses to various grade levels in one underfunded class. Undoubtedly, the ability of teachers to plan lessons for each day and period, balance their time between teaching different grade levels, conduct assessments of their learners' development, and maintain discipline is significantly impacted. In addition, teachers frequently omit curriculum adaptability, contextual examples, and curriculum connection to local needs in favour of abridged courses (Eppley, 2009:7; Aziz, 2011; Taylor & Mulhall, 2001:140).

2.5 Global Basic Education

The dynamics of globalisation must be taken into account when analysing global basic education (GBE). The underlying process of raising interconnectedness among individuals within a social stratum is known as "globalisation" (Verger, Parcerisa, & Fontdevila, 2018:3). Multiple scenarios in which this process has an impact on the world's basic education system must be addressed through policy. For instance, this process creates new difficulties that call for new education policies, such as globalisation-related changes to the labour market. (Verger, Parcerisa, & Fontdevila, 2018:3).

As a result, by offering knowledge-intensive services and goods as well as new labour

profiles, countries are able to increase their level of international effectiveness. Inadvertently, this promotes education and instructional content on the concept of talent and ability possession. According to the World Economic Forum (WEF) (2020), 65% of learners entering school today will work in occupations that do not yet exist. In addition, they will need to have the necessary digital skills to handle the challenges of the 4IR's upcoming vocations. History demonstrates that industrial revolutions affect both production and education (Becker, Hornung, & Woessmann, 2011:93).

According to Dabla-Norries et al. (2015), the author compared the economy's income capacity to education inequality. The study indicated that the average years of education had declined significantly with different income levels within the economy globally over the past 60 years; a more significant decline is reported in emerging markets and developing countries (EMDCs). The author reported that despite the improvement and advancement of education in this period, education outcomes are still worse for the disadvantaged population; these are mainly due to government public spending biases (Castelló-Climent & Doménech, 2014; Dabla-Norris et al., 2015). Compared to EMDCs, the advanced economies' ratio of education inequality over the past decade is still changing, with rising education costs as a contributing factor.

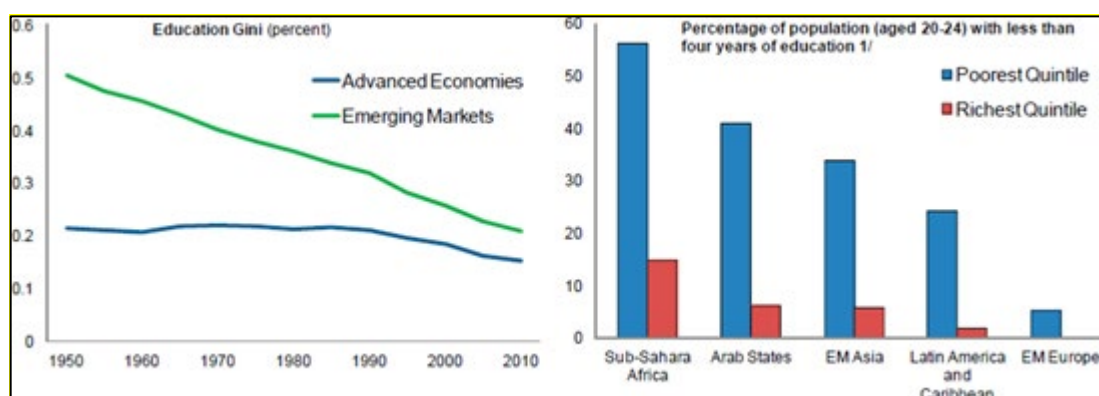


Figure 2.1: Education across different economies. Source: Adapted from Castelló-Climent & Doménech (2014)

Education systems must change if they are to equip learners with the knowledge and abilities needed to create a more just and productive society. Schools must promote the

development of both hard and soft skills so that learners can create inclusive and equitable societies. Hard skills include resource management, technological design, and communication (WEF, 2020). These abilities are necessary for people to advance in a rapidly changing world that is more complex and interconnected (OECD, 2019). Learners who are better equipped for the future will be able to depict change, support others constructively, comprehend their goals and emotions, and predict both the immediate and long-term effects of social issues (OECD, 2019). Schleicher (2016) argues that, as a result, educators must embrace digital tools for learning and acknowledge how various domains of knowledge are expanding.

Schools must meet the demands of learners' future jobs, technologies that have yet to be invented, and obstacles that have yet to be predicted (OECD, 2019). According to the World Economic Forum (WEF), in order to address today's most complex challenges, such as global climate change, ecosystem degradation, and natural resource depletion, education must implement an environmental and ecological study involving educational practices and new curricular systems to inspire human engagement and action in resolving environmental issues (2020). Ecological and environmental studies use creative teaching techniques and curriculum to motivate learners to take action to solve environmental challenges. According to the United Nations Educational, Scientific, and Cultural Organisation, education can play three roles: (1) it can fulfill its responsibility in the development of social and individual capacities and attitudes to mitigate climate change and empower people to act proactively toward the future; (2) it can develop skills, capacities, and attitudes to adapt people to the obvious and impending climatic impacts; and (3) it can stimulate and reinforce understanding of climate change.

The COVID-19 pandemic containment measures caused more than 1 billion children of all ages to miss school, according to the OECD (2020), which increased the use of digital technology in education. Furthermore, Burgess & Sievertsen (2020) contend that the outbreak had a significant negative influence on the global economy and interfered with all aspects of daily life. The newly launched challenge also provides previously unreachable insights into how the climate catastrophe can be controlled because the

COVID-19 pandemic is akin to what is anticipated from the impending global climate calamity.

2.5.1 Basic education in the Czech Republic

Europe is made up of several nations, regions, political alliances, and partnerships. The region has some of the world's biggest deserts as well as densely populated places. Europe is home to the European Union (EU), the world's biggest commercial bloc, as well as a plethora of bilateral and multilateral agreements that control economic, social, and political connections between states and regions. Variable geometry (Delrio & Dondi, 2008:246) is a term used to characterize the European region's variety in culture, economics, politics, and demography, as well as the sometimes unclear criteria used to choose which states or areas are included in the alliance.

The Czech Republic has prepared an educational policy plan for 2014–2020. The plan's three main goals were to reduce educational disparity, enhance high-quality teacher training, and promote responsible and effective educational system administration. The linkage of the plan to ICT in primary and secondary schools is based on a broad awareness of the relevance of digital technology in teaching and learning. The project contains a unique strategy for digital education, with a strong focus on upgrading the Czech Republic's educational system and enabling learners to become lifelong learners in a digital society and labour market.

The digital education plan includes three key intervention objectives: novel digital teaching and learning methodologies, student digital skills relevant to school, and computational thinking progress. Concrete initiatives are practical projects that focus on ICT equipment purchases and instructor ICT training. The digital education plan includes three key intervention objectives: novel digital teaching and learning methodologies, student digital skills relevant to school, and computational thinking progress. Concrete initiatives are practical projects that focus on ICT equipment purchases and instructor ICT training.

2.5.2 Basic education in Finland

The National Strategy for 2000–2004 for Education, Training, and Research in the Information Society was unveiled by Finland (Delrio & Dondi, 2008:246). Early attempts to include ICT in elementary and secondary schools frequently concentrated on teaching computing as a topic with little other curriculum integration. The multimedia computer made its debut in the early 1990s as a potential educational tool for courses (Plomp & Voogt, 2009:1). National governments started creating policies for ICT as a tool for enhancing learning in both content and themes with the advent of the Internet.

Then, from the mid- to late-1990s, various EU initiatives for integrating ICT into elementary and secondary education emerged, bringing these goals to the level of international collaboration. In recent years, there has been a correlation between the use of ICT in elementary and secondary education and the overall growth in knowledge, skills, and competences required of Europeans. Examples of this relationship may be seen, for example, in the OECD PISA study frameworks and the EU's Key Competencies for Lifelong Learning definition (OECD, 2019). The Finnish National Matriculation Examination Board (FNME) is digitizing the matriculation examination in Finland (2016–2019) via the DigiAbi digitization initiative. Through this initiative, Finnish learners will be able to reply to matriculation test questions using the most common office products, including multimodal text (text, photos, voice, and video).

2.5.3 Basic education in Austria

In 2014–2015, Austria implemented a school-leaving exam that was computer-based, and in 2016, it introduced digital textbooks. Additionally, funding initiatives for mobile applications and interactive whiteboards have been started. With an emphasis on essential transversal competencies as their primary outcomes, secondary school reforms seek to create educational practices that align with contemporary society (Ottestad & Gudmundsdottir, 2018:2). The Ministry of Education has gathered strategic objectives, measurable steps, and tangible projects under the overarching goal "eFit 21." The primary strategic goals are to use ICT in schools to improve the effectiveness and quality of teaching and learning and to promote digital literacy skills and social inclusion. The LMS

(Learning Management Systems) initiative, which offers teachers learning modules for competency-based instruction, is an example of a tangible product. The www.digikomp.at project in Austria is especially noteworthy since it offers a framework for digital competence to learners and teachers in grades 1 through 12. Although it highlights the significance of digital competency in topic teaching, teacher education has not included it.

In computer-supported collaborative learning (CSCL) methods, education occurs through interpersonal communication on a computer or the Internet (Wilson & Scalise, 2016:145). Video, chat, emails, discussion boards, and information forums can all be used for collaboration (Luo et al., 2017:2728; Stone & Logan, 2018:45). These methods can be applied in a physical setting, like a classroom, or online. Approaches frequently employ specific technologies for creating work, such as collaborative platforms like Google Meet, Google Docs, or Slack (Al-Samarraie & Saeed, 2018:77). China has also embraced social messaging services like WhatsApp and WeChat (Stone & Logan, 2018:45). The ability to use collaborative technologies can also help promote student participation (Stone & Logan, 2018:46). During the present pandemic, specific strategies can support fostering relationships and preventing disengagement (Masters et al., 2020:1). Therefore, building social capital and connections may be encouraged.

With the correct technological innovations, communication can be improved between teachers and learners as well as between learners and their classmates (Luo et al., 2017:2728). Additionally, teachers can depend on learners having set schedules by interacting with them in real-time via video technology (Swartz & Chetty, 2021:121). (Masters et al., 2020:2). Live classes can be delivered synchronously, asynchronously, or a combination of the two. Collaborative learning methods enabled by computers have a long history of positive research. When comparing collaborative learning with autonomous learning utilising computer-based education. Chen, Hwang, and Chang (2019:2) discovered significant beneficial results even when focused exclusively on school-aged learners. A particular outcome measure for employing CSCL in distant learning was reported in one study, and it was discovered that the impacts were favorable

and of a similar magnitude to overall CSCL results (Jeong et al., 2019:2). Chen, Hwang, and Chang (2019) discovered benefits for social interaction and group task performance in investigating the effects of computer use for collaborative learning. The manner in which CSCL appears to have been applied in particular fields is an intriguing research discovery. At the elementary school level, Chen, Hwang, and Chang (2019:2) discovered that all the research concentrated on using CSCL for science, math, or language instruction. At the secondary school level, math and science were the only subjects covered. While Lin (2014) discovered a good influence on second language acquisition, Jeong et al. (2019:2) demonstrated that CSCL positively impacted STEM subjects.

Australia has used the broad body of international research in various ways over the past century to apply best practices in distant teaching. Long-term remote schooling periods make Australia's expertise in supporting teachers and using evidence-based practice particularly pertinent. The following information is based on a triangulation of these suitable practice lessons and considerations from the local and global evidence bases. These concepts, depicted in Fig. 2.2, include teaching for inclusion and equity, community collaborations, parental involvement, and teacher support.

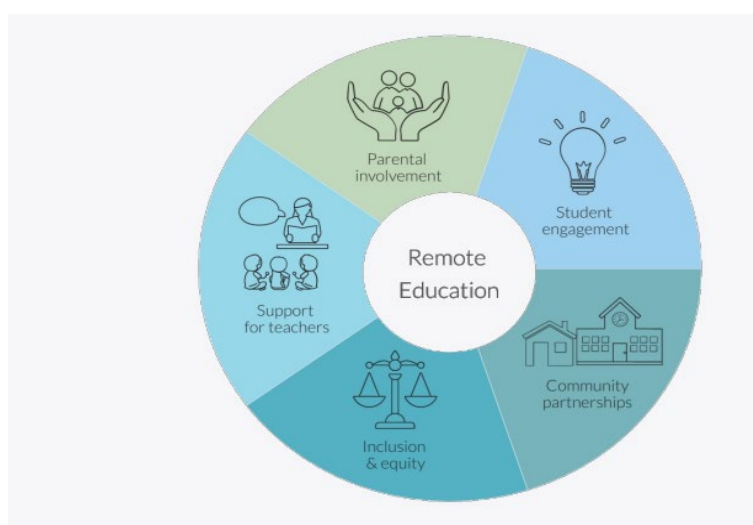


Figure 2.2: Principles of good practice in remote learning. Source: Adapted from Pop-Eleches & Urquiola (2013:1293).

2.6 Basic education in Africa

Mbiti (2016) claims that during the past two decades, there has been significant growth in the amount of money invested in and the GDP spent on education in developing nations. Despite this investment in education, many classrooms and schools continue to have limited access to resources for instructors and learners. A case study revealed the discrepancy between the average pupil-teacher ratios in certain African nations, with the ratio in Chad and Malawi being 60:1 and the ratio in Tanzania, Burkina Faso, and Uganda being 40:1 (Mbiti, 2016). However, statistics suggested that this ratio, at a ratio of 90:1, might be greater in rural or informal communities. Additional research revealed that certain primary and secondary schools in the sub-Saharan region still struggle with access to portable water, electricity, and proper toilet and hygiene facilities.

In some sub-Saharan nations, concerns like pupil attendance in primary school may be related to the family's socioeconomic group, according to Roser & Ortiz-Ospina (2018). Since numerous learners enrol in some primary schools but fewer than half of those children attend class, the author hypothesised that there were considerable discrepancies between student enrolment and attendance. This was typically attributed to children from low- and middle-income households in this region, and it has been found that the family's financial situation significantly influences whether or not a youngster attends a particular school.

Africa currently has more primary school learners than ever, more females attending school, and more literate women. E-learning is an expanded type of classroom education where online or offline learning is facilitated by computers, telecommunication devices, networks, and storage capacity. The key advantage of using e-learning instead of traditional methods is that learners gain communication skills and personal abilities like autonomy, analytical perception, abstraction, and others. This is in addition to the knowledge being delivered easily and interactively (Dargham, Saeed, & Mcheik, 2013:340).

Over time, information and communication technology (ICT) has evolved into a crucial

driving factor behind digitalisation and e-learning. Aiyebelehin (2012) observed that instructors utilised computers, multimedia boards, projectors, phones, the Internet, scanners, and photocopiers to meet their information needs at schools in Oyo State, Nigeria. According to his results, the majority of computer users (57.26 percent) use them monthly, the majority of multimedia users (52.56 percent) use them infrequently, and the majority of projector users (125, 53.42 percent) use them occasionally. Previously, Ajadi, Salawu, and Adeoye (2008:3) observed that the most common kind of e-learning employed in Nigerian schools took the form of lecture notes on CD-ROM that could be played whenever the learners chose. It is acknowledged that there are relatively few schools in Nigeria that have incorporated high-quality digital education. Greensprings School in Lagos State was one of the first schools in Nigeria to equip learners with such cutting-edge educational technology, and it has certainly enhanced teaching and learning.

The school's virtual learning environment (VLE) program, known as the Greensprings Virtual Learning Environment Program, was formally launched in October 2012. Teachers in elementary and secondary schools received in-depth training in using laptop computers, Android tablets, and interactive whiteboards. The school's VLE program was implemented in stages, as follows: Years 1, 2, and 3 were the first to use Android tablets; shortly after, years 4, 5, and 6 began using a higher-level brand. - Classmate PCs (personal computers) were given to grades 7 through 11, but grades 12 already had them. Later in 2013, the school decided to employ EUREKA, a multimedia platform, to supplement their lesson notes. The school selected this medium because multimedia allows for smoother pupil assimilation. Over 4,000 topics from the nursery, primary, intermediate, IGCSE, and A-level divisions may be found in the application. The primary and secondary schools in Greenspring are used as a case study to examine the effects of e-learning and digitalisation on educational institutions.

2.6.1 Basic education in Kenya

According to Makewa (2013:52), on the list of the top 10 trends in Kenya's business for 2011, Kenya has experienced exponential growth in ICT innovation and evolution over

the past two years. Going mobile and going big is one of his ten key trends. He pointed out that mobile search traffic in Kenya has dramatically increased. Due to the instantaneous, contextually appropriate information access offered by mobile search, more people use their mobile devices for business than computers. He also points out that mobile penetration in Kenya vastly outpaces broadband penetration despite the anticipated increase in internet availability in 2011. At this point, mobile is not going to overtake broadband. Kenyan advertising must therefore consider mobile. In addition, educators have come to consider the importance of ICT in educational pedagogy.

Despite the challenges that principals encounter, it is hard to overestimate the significance and application of ICT in secondary school administration. On February 15, 2010, the Kenya National Examination Council, the body in charge of administering exams in the country, issued a circular to all provincial education officers, district education officers, and secondary school heads informing them that registration for the 2010 Kenyan Certificate of Secondary Education (KCSE) was now open. According to the Kenyan Standard, "this year's KCSE applicants will be registered online on the Kenya National Examination Council (KNEC) website, in conformity with the examination council's revised guidelines." According to Paul Wasanga, CEO of KNEC, "candidates' registration using this technique should be carried out using the internet platform to submit their data." "Schools without internet connections may access this capacity via cybercafés or government entities with internet access," the speaker went on to say.

In January 2006, Kenya published a national ICT policy giving ICT priority. The Ministry of Education introduced the National ICT Strategy for Education and Training in June 2006, and this served as the foundation for the Ministry of Education to build its sector strategy on ICT in education. (2006) Ministry of Information and Communications The Kenyan government is eager to use ICT and other tools to improve education access for all Kenyans. The government plan provided a unified structure and direction for public schools and all other sectors and was designed and developed with funding from GOK in March 2004. The strategy's objective is to improve communication between the business community and Kenyan residents as well as between GOK institutions when it comes to

developing and implementing ICT. In addition, the ICT policy mandated the creation of standards for hardware, software, and training that take into account the usage of reconditioned computers in schools and offer additional assistance as necessary.

2.6.2 Basic education in South Africa

South Africa is a diverse cultural country with approximately 60 million people and is in Africa's southern region. Basic education in South Africa before 1994 was based on a set of inferior educational prospects for people of colour. However, after 1994, the government's National and Sustainable Development Plan sought to address previous inequalities through equal and inclusive education for all. Education reforms, a shift to outcome-based education, new standards and certification authorities, and resource redistribution are all part of this reorganisation. However, despite the restructuring and reformation of basic education for an equal and inclusive education system, there are still significant challenges facing the basic education sector in South Africa.

Section 29 of the Republic of South Africa's Constitution of 1996 (Act 108 of 1996) states that everyone has the right to basic education, including adult basic education, as well as the right to receive instruction in the official language or languages of their choice in public educational institutions where doing so is reasonably practical and the right to establish and maintain independent educational institutions at their own expense. The state is required by Section 7(2) of the Constitution to preserve all fundamental rights through all of its organs.

The South African Schools Act, 1996 (Act 84 of 1996) says that the Minister of Education is in charge of setting national education policy for planning, providing, financing, coordinating, managing, governing, programs, monitoring, and evaluating the education system, subject to the constitutional authority of provincial legislatures under Section 146, the principles listed in Section 4 of the Act, and the applicable provision.

The South African basic education sector faces challenges such as incompetently trained teachers, a higher inconsistency ratio of teacher to learner, insufficient school

infrastructure, poverty, violence, learners' attitudes, and historical disadvantages. Despite the difficulties encountered, most South Africans recognize that education is an absolute necessity in society, as it provides skills, knowledge, and values that form the basis of lifelong learning and professional success. Furthermore, the author argued that education ends the generational cycle of poverty and disease by providing an essential basis for sustainable expansion. According to Serfontein (2014:2264), the education system in South Africa is led by clear goals acknowledged by the educational bodies. This includes equipping learners for employment and social and political involvement in a rapidly changing and active global society and economy. The author expressed that education aims to enable learners to make sense of the world around them and bring out the curious nature of learners to determine and act to achieve their own goals.

In reaction to South Africa's past and uneven political system, schools must foster a contemporary, creative atmosphere. There have been severe disruptions to schools and the educational system both globally and domestically. The 4IR allows South African educational institutions to develop a culture of creativity and innovation. STEM (science, technology, engineering, and math) courses for 4IR should take into account new concepts. The new curriculum should emphasize the demand for 4IR reading as well as 4IR collaborative ability. Furthermore, institutions must be modified as part of educational responses to 4IR in order to create new interdisciplinary scientific programs (Penprase, 2018:219).

According to Chetty and Pather (2015:5), technology may aid in the resolution of social issues. In other words, technological advancement may be used to bridge the gap between the wealthy and the poor, as well as between different ethnic groups. The 4IR allows educational institutions to work with other stakeholders, such as the government and commercial enterprises. The president of South Africa established a 4IR panel comprising individuals with different skills, including professors from several educational institutions. IBM, Microsoft, and other private firms have been outspoken advocates of the 4IR. These firms or stakeholders may work together on R&D projects.

Furthermore, South African educational institutions may collaborate with colleagues all across the world. South Africa's educational system, according to Rodny-Gumede (2019), has not fostered a culture of innovative and creative thinkers. Training innovative potential is critical to the success of the 4IR educational system. R&D performance and growth are inextricably linked to encouraging innovation and building creative talent. Governments and higher education institutions must also invest heavily in research and creative university curricula to maximise the benefits of new technological breakthroughs and improve education in South Africa in light of technological advancement. Meyer & Gent (2016:2) make the following suggestions:

- a) For long-term sustainability, the educational system's capacity to utilise ICTs as support must be technologically improved;
- b) Learner performance must give way to capacity increases;
- c) It is necessary to adopt a phased strategy with acceptable temporary goals;
- d) Progress should be monitored using a variety of metrics, with an emphasis on determining how much of the system is embracing technology and how well-equipped instructors are to integrate it into the teaching and learning process.

The following innovations are crucial to making progress:

- i. In ICT efforts, increasing the emphasis on teaching and achieving strategic alignment of ICT integration at all levels of the educational system;
- ii. Increasing teachers' talents, confidence, and motivation to utilise ICTs in teaching and learning, with an emphasis on long-term participation;
- iii. Transitioning from pilots to integrated solutions are all methods of ensuring ICT integration. To adapt to the difficulties of the 4IR, institutions should maintain a constant emphasis on management systems, self-awareness, processes, and technology (Marshall, 2016:299).

2.7 Parental Involvement

Strong evidence suggests that parental involvement can improve educational engagement in developed and developing nations (Houtenville & Conway, 2008:437; Pop-Eleches & Urquiola, 2013:1294). No matter the method of instruction, parental

involvement in their children's education is crucial, according to research (Lee & Bowen, 2006:193). However, because of the prolonged school closures, parents and caregivers play a crucial role in assisting learners with their academic challenges during remote schooling periods, particularly for younger learners and learners with disabilities who are unable to engage in online or remote learning on their own. Therefore, it is critical to comprehend what children are learning and to establish techniques to assist their health and well-being while under lockdown and isolation. Furthermore, adopting a parents-as-partners mechanism that promotes and supports efficient and cooperative communication between school and home can only improve the educational experiences of learners who have been most negatively impacted by the COVID-19 pandemic.

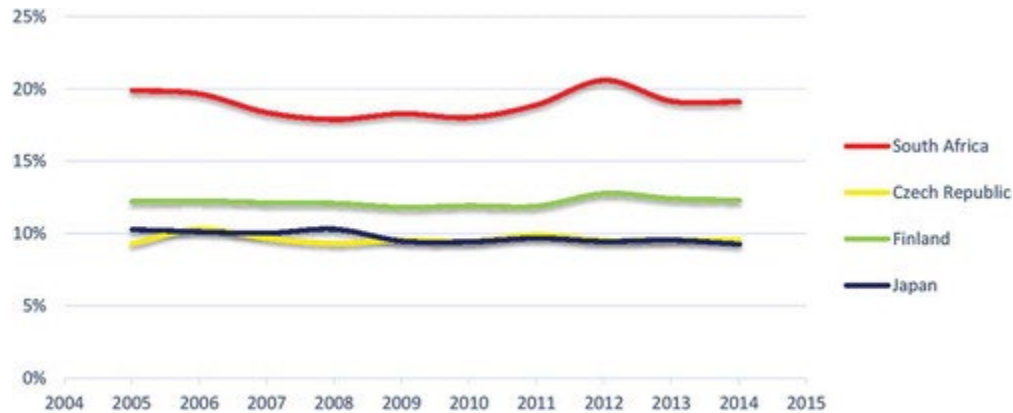


Figure 2.3: Expenditure on education as a percentage of total government expenditure. Source: World Development Indicators (2017).

As illustrated in Fig. 2.3, public education spending in South Africa is still relatively high compared to that of the Czech Republic, Finland, and Japan. SDG 4 aims to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all," and target 4.1 is to "ensure that all girls and boys complete free, equitable, and high-quality primary and secondary education by 2030, leading to relevant and effective learning outcomes." The Czech Republic, Finland, and Japan have the most successful educational systems, outperforming South Africa in terms of performance and results despite expenditure per capita being far lower. Since eighth-grade learners discovered the 2002 TIMSS test extraordinarily difficult, one South African learner in grade 9 took the

grade 8 TIMSS 2011 test in place of grade 8 learners (Reddy & Hannan, 2019:389). The 2002 grade 8 group received criticism for guessing on multiple-choice questions, which reduced the study's validity and precision (Michaelides, Ivanova & Nicolaou, 2020:189). The Southern and East African Consortium for Monitoring Educational Quality (SACMEQ) 2 test, which started in 2006 and ended in 2011, included participation from SA. About 9071 learners in Grade 6 were examined, and 27% of them were found to be illiterate, while another 40% were found to be functionally innumerate.

2.8 Digital Technologies for Education

Digital technology for education is a set of tools, processes, technologies, strategies, and technical resources used to improve learning experiences in various educational or teaching processes such as non-formal, formal, and informal learning, learning-on-demand, and real-time learning. This includes highlighting how rapidly evolving innovations in educational technology, such as smartphones and mobile technologies, augmented and virtual realities, collaborative learning, social networking, cloud computing, and flipped classrooms, have evolved from being used as teaching tools.

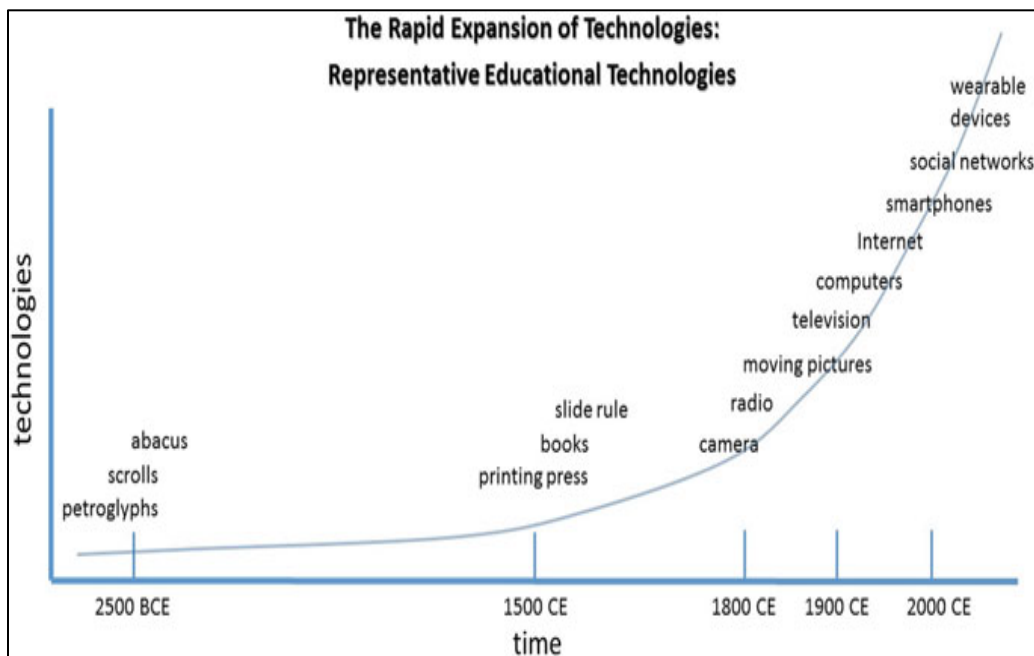


Figure 2.4: The rapid growth and innovation of digital technology for educational purposes. Source: OECD (2014).

This educational technology's rapid growth has brought about innovation in the education sector and the introduction of policies that will aid them in implementing this technology in the basic education sector. A previous study collected data from schools to measure how technology implementation innovation has significantly changed practice, process, organisational, or marketing methods at the education system level, focusing on changes in practice (OECD, 2014).

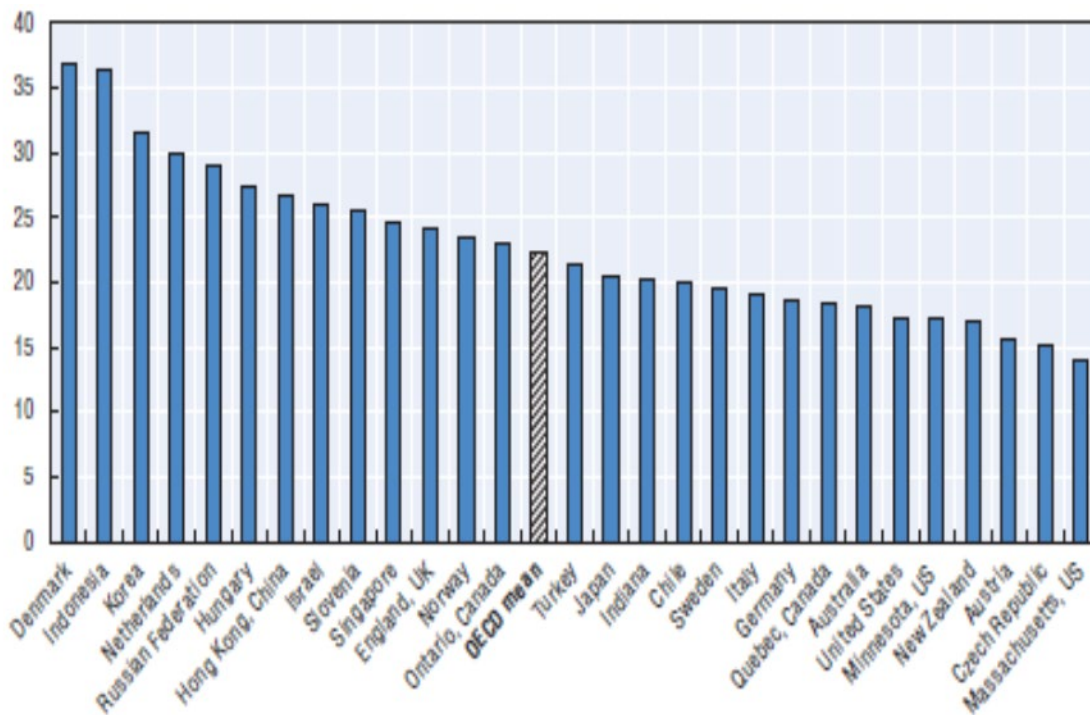


Figure 2.5: Growth and innovation of digital technology per country. Source: Adapted from the OECD (2014).

The rapid growth and innovation of digital technology for educational purposes and the innovative use of digital technology tools in the education sector lead to the concept of information and communications technology (ICT). ICT tools and the Internet have enhanced teachers' and learners' learning experiences as learners can more readily search for information and acquire knowledge beyond the resources available through textbooks and teachers. ICT tools in education include online educational video recordings, books, audio recordings, the Internet, and databases (OECD, 2016). Thus, the use of technology in education requires knowledge from different areas like

psychology, pedagogy, computer science, and informatics. For these reasons, there are different opinions on the use of digital technology in education, and different researchers explain the concept of technology in education according to their requirements (OECD, 2014; OECD, 2016). However, digital technology in education is still underutilised in many institutions, primarily due to a lack of equipment, financial resources, fewer qualified teachers, and inappropriate means of implementing the funds needed to incorporate this technology.

Marshall (2016:288) claims that "the importance placed on education in modern civilizations is one of their defining characteristics." A significant overhaul in the education system is required to ensure participation in the digital society and to allow nations to profit from the 4IR. Though "wicked obstacles" may develop in the classroom, Wicked issues are characterized by mutually dependent and linked challenges that need several explanations for their key components (Marshall 2016:297). The growth of in-person training and numerous asynchronous educational materials in the 3IR must be built upon in any education plan for the 4IR. Any education strategy for the 4IR must take into account the expansion of in-person training and the abundance of asynchronous learning resources in the 3IR.

Education in the fourth industrial revolution (HE 4.0) is a demanding, dialectical, and exciting opportunity with the ability to benefit society. The 4IR has far-reaching repercussions in many spheres of life. As a consequence, it provides both educational possibilities and problems. Using multiple 4IR components such as IoT, 3D printing, quantum computing, and AI, the education business may totally modify its offering of answers to new difficulties. Butler-Adam (2018:1) emphasizes that one of the 4IR's impacts on the educational sector is curriculum, teaching, and learning rather than robotic tutors. In other words, learning and teaching must occur in all areas. Teachers and learners from various disciplines need to be educated on the numerous components required for the 4IR to be applied successfully. Understanding the political and social aspects of the society learners live in requires the need to apply the basic sciences (Butler-Adam, 2018:1). Theoretical knowledge of artificial intelligence (AI) and how it

works is also required of learners who major in the humanities and social sciences. In light of the assertion mentioned above, the 4IR promotes the idea of a multidisciplinary field where technologies are used in conjunction with the humanities and social sciences to address difficulties. The 4IR, the development of biotechnology, and AI significantly question presumptions about people and their connections with nature. Therefore, the development of 4IR liberal arts curricula that consider the societal changes brought on by the 4IR is crucial.

According to Penprase (2018:221), political and social issues need to be addressed in the 4IR curriculum brought on by the rapid speed of technological innovation. A theoretical foundation for digital pedagogy is required due to the growing use of AI in teaching and learning, online training, and other factors (Penprase, 2018:221). Learners need to develop adaptive skills to survive in the global digital society so that they can benefit from the digital economy, which includes innovation, creative expression, social inclusion, and digital literacy as new opportunities for employment (Brown-Martin, 2017:7).

It is arguable that the impact of change on the educational system must consider the digital education strategy. Therefore, if learners are not well educated due to insufficient resource investment, it poses a serious issue as it may influence the quality of graduate education (Marshall, 2016:295). Furthermore, Marshall (2016:295) argues that quality education is vulnerable due to "wicked challenges." Due to continuous changes in the educational environment and strategy, planning to operationalize "quality measurements, performance indicators, and educational outcomes" becomes more challenging (Marshall, 2016:297).

Several challenges concerning education and technology growth were raised in the 2004 White Paper on e-Education, the National Development Plan, and the Action Plan of the Department of Basic Education. Among these challenges are:

- determining whether teachers require educational support;
- honestly and promptly evaluating educational outcomes;

- equipping teachers and learners with new 21st-century abilities;
- granting access to online professional communities and content;
- increasing student focus, novelty, freshness, and enjoyment of learning;
- facilitating self-learning and exploration;
- encouraging analytical thinking and exposure to fresh perspectives; and
- easing administrative costs such as reporting absences and marking tests (Meyer & Gent 2016:4).

A lack of resources is one of the primary obstacles to successfully implementing the 4IR in South African education. Even though education funding has lately increased, it is still insufficient to guarantee that educational institutions can operate at full capacity. It has resulted in increased education tuition and less money for research, among other things. The problem for educational institutions is to strike a balance between spending more on new technology breakthroughs and prioritizing what they can do with the money. Massive financial assistance is necessary for new technologies to be effective in educational institutions.

Qualified academics and technology infrastructure are the most expensive parts of offering instruction (Brown-Martin 2017:9). The exclusion of some socioeconomic groups from participating is another concern affecting the education sector that may undermine the 4IR's viability. Despite an increase in black student attendance since 1994, the gross participation rate of black South Africans—primarily African and coloured South Africans—remains much lower than that of white South Africans, according to Badat (2010:30).

Chetty and Pather (2015:2) go on to suggest that in order to dismantle apartheid's legacy, higher education institutions must integrate a new set of skills in 4IR to achieve social justice, equality, and equitable circumstances. PwC (2017:12) claims that 4IR technologies and their implementations usually need specialised skills in addition to basic digital literacy. Universities are leaders in the development of these talents. Being turned down by institutions would surely prevent you from gaining these specialised skills. Meyer

and Gent (2016:3) did research on the state of education and technology in South Africa for the National Education Collaboration Trust.

2.9 Digital technology Adopted in South Africa

2.9.1 Township and urban high schools' ICT access

According to Mathipa & Mukhari (2014:1213), every South African student must be knowledgeable in ICT to be employable in the future. This is due to a "policy statement" (White Paper, 2004, GED, 2007). " ICT skills must be acquired by South African learners at the pre-high school or high school level, according to Dzansi & Amedzo (2014:342), as some of them choose not to continue their education due to financial difficulties. They will be employable thanks to these capabilities. The Microsoft Foundation's partnership with the National Department of Education is meant to create a learning mindset. Similar initiatives are undertaken by a few corporations and non-governmental organisations to promote ICT integration in schools. A satellite internet tool called Mindset Learn provides educational materials to schools.

Under the Department of Education's contract with Microsoft, five years of software will be available to South African schools (Dzansi & Amedzo, 2014:342). However, it appears that these efforts exclusively help urban schools. Schools in rural and suburban areas are not included. This can be due to a lack of ICT infrastructure in rural and township schools. According to Dzansi & Amedzo (2014:342), rural and township high schools lack the facilities necessary for ICT integration and secure computer labs.

Additionally, they do not provide their learners with enough space in inadequate classrooms. Other obstacles to ICT adoption in rural and township schools include teachers' lack of phone connections, insufficient ICT competence, rising ICT implementation costs, and inadequate ICT support specialists. It should also be noted that South African rural and township schools are not able to take advantage of the potential ICT offers because of the restrictions associated with hardware and bandwidth. In addition, some township learners are interested in careers in information technology or internet applications, which are mostly not covered during tuition. Nevertheless, ICT can

deliver rightful access to education, according to Ng'ambi et al. (2016:845), because it enables everyone to access resources associated with digital education anytime and anywhere. Thus, ICT connectivity in remote rural schools is made accessible.

According to Ng'ambi et al. (2016:845), learners from rural and township areas have difficulties after enrolling in university since they typically lack digital abilities. They need to develop digital skills as part of their academic work to cope with lessons that require the use of digital tools. WhatsApp is increasingly being used as a teaching and learning tool. While learners in rural and township schools must deal with the difficulties, learners in urban schools benefit from digital tools. Using engaging ICT platforms like LinkedIn, YouTube, and e-learning, learners may communicate with people from all around the world. They have access to high-quality study materials as a result, and the relationships and attitudes between teachers and learners improve, which leads to better performance (Duffett, 2017:14; Lindberg et al., 2017:122).

Drawing from Mesfin et al. (2018:157) and Mathevula & Uwizeyimana (2014:1087), urban schools provide computer classes that make learners computer literate and have safe computer labs with internet access. Although access to ICTs, e.g., computers in urban schools, the Internet, and interactive whiteboards, still requires educators' incorporation of ICTs into the curriculum (Mathevula & Uwizeyimana, 2014:1087), ICT integration and proper application improve teaching and learning. It generates several cutting-edge pedagogical techniques that can be useful for schools, such as using mathematical tools by teachers to boost learners' digital and mathematical skills. Through discussion blogs, learners may also exchange knowledge. These pedagogical techniques can aid in the improvement of learners' communication, problem-solving, knowledge, and many other skills. Although ICTs are accessible, urban schools are not incorporating them into their curricula (Mathipa & Mukhari, 2014:1213).

Fewer teachers in rural schools possess sophisticated software development abilities than in urban schools. Given that one of the twenty-first century's most in-demand businesses is information technology, this is favourable for urban learners. Thus, these

learners can obtain these abilities while they are still young and enrol in a software programming course at the university without any prior programming experience. However, this can also imply that they are unlikely to find work. It is the goal of the "Teacher Laptop Initiative" (TLI) to supply computers to teachers in public schools. It was introduced by the South African government as the first step in tackling the digital divide problem. According to Mathevula and Uwizeyimana (2014:1088), this effort was initiated by Naledi Pandor, who was once the Minister of Education, but it has not been adequately implemented in every South African public school. However, the TLI will not resolve the issues rural schools still have because instructors' laptops do not guarantee access to internet connectivity or ICT expertise or that learners will use them for learning. Despite the South African government's efforts to close the digital divide, there is no evidence that learners from underprivileged communities are using digital learning materials.

2.9.2 Digital Technology for Teaching and Learning

Digital technology in education has three areas of use: technology, a tutor, a learning tool, and a teaching tool (Lazar, 2015:1; O'Neal et al., 2017:193). According to O'Neal et al. (2017:193), digital technology in education is employed by teachers for different reasons, one of which is to aid their learners' professional needs. This includes educational technology for creating lesson plans, lessons, and newsletters, communicating with parents, and researching new ideas. Further use includes engaging learners, developing vital skills for the future, and promoting critical thinking abilities.

Some studies explained that teachers used educational technology to reinforce skills, augment the curriculum, and transform their teaching skills. Further, in some reports, some teachers use computers for administrative purposes, like presentations, preparing lessons, managing student grades, spreadsheets, and word processing (O'Neal et al., 2017:193). However, even though digital technology has helped improve and is used by teachers to complete administrative and various teaching tasks, some teachers pointed out that there is a need to use technology to enhance learners' skills, particularly in areas where there are inadequate resources. The use of educational technology shows their high expectations for digital technologies and their incorporation in the classroom

(Ghavifekr & Rosdy, 2015:176). The author further elaborated that the new generation of learners is born and growing with technologies, termed "digital natives." The study further indicated that the younger the learners, the higher the expectations for integrating digital technology in the classroom for learning purposes.

Mesfin (2018:157) claims that digital transformation has been included in all processes in industries around the world, even those in emerging nations like South Africa. Due to the digital revolution, the educational industry has been obliged to improve its technology-based pedagogical approaches. Schools may use various digital platforms for educational purposes, for example, e-learning, m-learning, blended learning, and distant learning, for learning, teaching, and assessment. In the paragraphs above, these educational tools were introduced and briefly discussed.

2.9.3 E-learning

According to Turban et al. (2017:27), e-learning is the delivery of educational methods and materials via the Internet that can be accessed from many locations and used to meet learning, training, and teaching needs. According to Mesfin et al. (2018:158), e-learning uses digital instructional materials like "audio, video, text, and graphics" to support learning. This includes mobile technology like virtual reality or augmented reality. E-learning, as argued by Mesfin et al. (2018:158), facilitates education. When correctly planned and implemented, it offers pedagogical benefits. This makes better communication between learners and professors or between learners possible. It encourages teachers and learners to work together to teach and learn in a way that produces high-quality instruction and effective performance. In the outside world, where participation in digital processes is necessary, this prepares learners. According to Lindberg et al. (2017:122) and Mesfin et al. (2018:159), two barriers to the adoption of e-learning in schools are access to digital resources and the computer literacy levels of teachers and learners. According to Lindberg et al. (2017:123), learners' knowledge of how they might utilise ICT for study objectives is also influenced by their level of digital proficiency. The use of videos to disseminate programs or educational material throughout the whole school or between multiple schools at the same time, for instance,

enables educators and learners to exchange educational resources. This leads to sharing knowledge, high-quality education, and reduced costs. This benefits all schools, notably those with few resources, as they will gain knowledge from those with adequate resources if they have access to them. Information may be shared between teachers and learners (text, video, or audio) using digital tools; web-based e-learning can also encourage collaborative learning. As kids are less dependent on professors when exchanging information online, this can also help to encourage learners' participation and independence. They can carry out this activity whenever and wherever they choose. In this kind of learning, a teacher can only serve as a guide (Mathevula & Uwizeyimana, 2014:1088; Ng'ambi et al., 2016:845).

2.9.4 Blended learning

Van Oordt & Mulder (2016:341) argue that blended learning combines conventional face-to-face and technologically based online instruction. In addition, the combination of traditional in-person and online learning is known as "blended learning." Digital learning environments provide the convenience of remote and unlimited access to learning materials for learners. This appeals to learners because it provides them with a feeling of control. They can study at their own pace thanks to it. Slow learners benefit greatly from this since it allows them to review lessons until they are confident in their comprehension (Kleinveldt et al., 2016:62). Learner-centered blended learning can also be used where it does not require teacher presence for learners to learn on this platform. Through digital tools, this is possible online. In addition, learners can exchange knowledge with one another using these technologies.

This results in ICT-skilled learners ready for tertiary study and the world of work (Mathipa & Mukhari, 2014:1214; Kleinveldt et al., 2016:62). E-learning resources like podcasts or videocasts can be used to implement blended learning. The use of podcasts as an audio e-learning tool can facilitate teaching and learning by enabling learners to interact and engage with learning materials and related audio. Furthermore, learners can use Vodcast, an e-learning platform with a podcast containing video content. With this facility, learners are able to review teaching and learning materials without being present in a classroom.

Student-centered learning as online learning tools facilitate learning by learners to study anytime and anywhere—in the convenience of their homes or comfort places. Learners are able to keep up with teaching and learning or catch up on missed lessons (van Oordt & Mulder, 2016:341).

2.9.5 Distance learning

Distance learning is defined by Turban et al. (2017:24) as instruction delivered using technology from any location at any time. The traditional classroom is no longer required for learners to attend a class. Through the use of virtual tools, this can be accomplished online. According to Ng'ambi et al. (2016:845), Skype and WhatsApp as digital tools have facilitated distance learning accessible to everyone. Historically, a dedicated video-conferencing room had to be used for remote learning. This has been supplanted by using publicly available, cost-free platforms like Zoom, Skype, and WhatsApp. All that is required is an internet connection. All people can now access high-quality, fair education thanks to these technologies, even those living in distant places. This provides access and opportunity for enrolment at any preferred institution of higher learning irrespective of location in the country.

Furthermore, Edmodo provides another ICT-related learning platform to support distance learning. With the use of this instrument, remote learning is now feasible for both tertiary and pre-tertiary learners; these resources foster collaboration between learners and teachers. Digital skills are used by Kaler (2012:61) to evaluate learners' performance in online or distant learning high schools. utilising this type of education gets more challenging. Suppose a learner lacks these crucial abilities; the opportunity to leave comments on courses taken online gives learners a sense of empowerment that makes them appreciate online learning. According to Porter et al. (2016:18), having access to the Internet gives teachers and learners the opportunity to access curriculum-related content, including in schools in remote areas.

2.9.6 M-learning

M-learning, as defined by Turban et al. (2017:28), is e-learning done on mobile devices like smartphones and tablets. The adoption and usage of teaching and learning using

mobile phones (known as "m-learning") are a result of the ICT industry's rapid development. Traditionally used for receiving and making calls, mobile phones have evolved into hand-held computers. Through using programs like Edmodo, M-Thuto, and others, universities and institutions have begun utilising them for teaching and learning. M-learning offers learners several advantages, including the freedom to learn whenever and wherever it suits them. As a result of the portability of mobile devices, learners can even learn from automobiles. South Africa's population comprises 40% of people under the age of 19 (i.e., Generation Z). This group was created after the previous dispensation, giving them more opportunity than any other group. As a result, they have more chances, and most of them go to schools with mixed-race learners. Because they were created in the digital era, they are known as "screen addicts."

These learners use smartphones for nearly everything; thus, the South African educational system needs to adapt its curricula to include them. However, they are only familiar with a life surrounded by computers and cell phones. The stultifying nature of traditional teaching and learning techniques for these learners may influence how they perform (Duffett, 2017:14). According to Ng'ambi et al. (2016:846), the majority of learners have cell phones and utilise them for schoolwork. WhatsApp and Facebook are two examples of social networking applications that are increasingly used in education. In several nations, there are more mobile phone users than people.

Given that most learners hold them, these devices can give everyone access to high-quality education. However, even though the usage of mobile devices for teaching and learning is growing, some schools still resist the digital revolution due to obstacles like inadequate infrastructure, awareness, and ICT skills among educators and learners. According to Porter et al. (2016:18), several schools have outlawed the use of mobile devices inside their buildings due to issues like disturbances caused by phones in the classroom and learners viewing unsuitable content online.

2.10 Benefits of the use of ICT for teaching and learning

A. Promotion of active learning and critical thinking

The advantages of employing ICT have already been highlighted in several past studies, with many publications articulating the encouragement of active learning processes possible with technology and the advantageous nature of multi modal instruments driven by ICT. Perhaps one of the greatest benefits of ICT, as mentioned, is that it promotes lifelong learning. Even when conventional media is employed in the classroom, learners will constantly seek out new sources of knowledge and instruction. Furthermore, the Internet and ICT are limitless sources of knowledge. In this way, technology can assist in converting a situation that is teacher-centered into one that is learner-centered. There are various advantages to this, and the authors emphasize that, by finding the right material, demonstrating how passive learning transforms into a problem-solving activity while learning, and demonstrating how new, broader understandings are formed, ICT can help learners improve their ability to think critically. Finally, technology can take appropriate forms that address various learning needs, even in environments where e-learning is practiced. example, collaborative learning.

B. Promotion of skills beyond learning

The triadic relationship between autonomy, capacity, and creativity is highlighted by Lowther et al. (2016): 23. Since learners oversee their learning materials, often in non-linear ways, ICT use as a learning tool promotes independence. While computer science offers all these tools that enable people to express their ideas, individuality, and preferences in the development of things, which fosters creativity, it also increases capability since learners learn how to use newly gained knowledge in a variety of scenarios. This increases learners' confidence in handling previously passively conveyed knowledge and frequently results in changes in the roles of the learner and the educator, such that the tutor's role becomes more similar to a coach's.

C. Benefits for the educational institutions

The effectiveness and level of service provided by educational institutions can both be significantly improved by ICT. ICT integration in the classroom introduces several innovations that may inevitably result in reduced bureaucracy, higher productivity, and a stronger emphasis on student success. Additionally, in educational institutions that move

beyond the conventional, learning does not have to be a process that is tedious and uninteresting but may instead be creative, friendly, and beneficial. For example, teacher-centered approaches can become more appealing, demonstrate learner-friendly methods, and help learners reassess learning as a process. Additionally, a big part of the methodology behind employing ICT calls for project- and group-based learning. Compared to earlier, more conventional modes of education, these pedagogical approaches alone have proven to be more appealing to learners. The dissemination of learning materials in a more flexible, fast, and simple way has additional advantages for educational institutions because it frequently eliminates the logistical load of having to collect learners in one location. This is primarily accomplished through distance learning strategies, in which learners can acquire knowledge in online labs and schools that are merely virtual. While platforms for online learning like Coursera and Udacity offer simple consumer access to courses that learners may view whenever they want from the comfort of their homes, these teaching strategies have served as the cornerstone for partnerships on both a national and international level.

D. Promotion of equal opportunities

ICT-based learning can support equal learning possibilities if it is adequately developed. Today, more than ever, the democratization of knowledge is possible because ICT, by nature, tries to transmit information widely. Today, there are more online digital libraries, virtual labs, communication tools, and knowledge thesauri than ever before. Instant access to information is made possible by resources like Wikipedia, and the new drive toward open access to research results multiplies the impact of information and knowledge sharing. However, in order for academic knowledge to be accessible to everybody, it must be widely and freely available online.

E. More attractive learning

ICT promotes understanding and awareness of the learning material by utilising a variety of sensory signals and combining text, speech, images, and video. As a result, the learning process improves and can be used to generate new concepts by being more detailed, constructive, and attractive in the end. Additionally, because people place

varying values on distinct sensory channels in how they filter information when learning, integrating several sensory inputs aims for higher personalisation. Typically, when receiving, processing, and remembering information, individuals balance their use of visual and auditory information differently. In addition to the benefits mentioned above, digitally designed educational materials can dismantle the constraints of space and time, allowing for more non-linear learning styles and advocating for a combination of formally, informally, and informally structured conditions for self-paced learning, which constitutes constructive education. Therefore, with proper planning, academic instruction and recreational gaming may be ideally matched. Therefore, educators must include technology in every subject they teach if they wish to fully explore digital technology's advantages. In order to ensure that the chosen technology is compatible with the outcomes of the curriculum, instructors must first comprehend and absorb the content. Then, they must build the necessary technical competencies and integrate these skills into their pedagogy. Teachers will face unique difficulties in this process as they attempt to develop a comprehensive technological content base and practical assessment techniques for a new curriculum area like technology. Due to the unexpected nature of the learning and the inability to expressly state it as a prescriptive content outcome, this integration necessitates curriculum flexibility. However, there is a wide diversity of learning requirements and talents among learners in classrooms.

ICT advancements in the classroom are not always designed for learners with learning challenges. To address these learning impediments, teachers might need to be specially trained in the use of technologies in a supportive capacity. Many South African teachers place a strong emphasis on delivering the curriculum; therefore, using technology to do so becomes an "add-on," as was already indicated. The potential advantages of developing technologies are not incorporated into the teaching strategies of educators who are afraid of technology. According to Klopfer et al. (2009:2), modifying current educational practices is complex, especially when digital technology is involved, and teachers require the proper training to become proficient technology users. According to Klopfer et al. (2009:2), "adopting and integrating technology-based instructional practices has a long history of obstacles, but with it has come a tremendous understanding of how

to accomplish success with them." "The full potential of technology for teaching and learning will therefore remain underutilised until teachers become familiar with it."

2.11 Challenges and barriers in the use of ICT for teaching and learning

In addition to the obvious benefits of using ICT in education, other works have adopted a more critical position, according to Goh and Abdul-Wahab (2020:159). The authors of this article contest the educational usefulness of ICT. For this, they point to several endogenous and external causes. These are mostly connected to the thoughtful design of instructional materials, learners' access to ICT, and perceptual aspects associated with encouraging the application of ICT as a tool for education when more conventional methods are adequate for the teacher. The authors outline a number of challenges to using ICT in teaching. Most of them are related to the teachers' lack of support and training. The objective is not merely to instruct instructors in the technical and practical use of new technology; instead, it is vital to persuade teachers of the pedagogical value of new technologies and the manner in which they can be used in conjunction with pedagogical principles.

According to Barbosa and Souza (2021:3), a score-based educational system pushes teachers to put in an unlimited amount of effort to complete the necessary curriculum by the stipulated dates, leaving little to no time to use alternate teaching materials. Because many countries have made significant progress in equipping schools with computers, mobile devices, and interactive whiteboards over the last ten years, education systems and authorities should focus not only on training teachers but also on allowing them to see the use of computers and other ICT in class as a way for them to be creative in their use. Firstly. Rather than pushing digital tools, schools must listen to teachers in order to appropriately integrate ICT into the teaching process. Teachers should also participate in active subject discussion to offer best practices and lessons learned.

ICT is primarily used in education as a tool to help learners develop their abilities, critical thinking, and creativity. It is also used to prepare tests and presentations using digital

slides. ICT still needs to be adopted while applying suitable teaching methodologies, even after many of the practical, educational, and pedagogical constraints have been addressed. Numerous studies have shown that when used properly, technology is typically appropriate in learning environments focused on learners, promoting cooperative learning, using a constructivist approach, and problem-based learning to actively involve the learner in the process of acquiring knowledge. The use of ICT may be restricted, its outcomes may be questioned, and attention may be diverted towards more traditional techniques, regarding the use of ICT as redundant, if the instructional materials and practices are not focused on these strategies. Digital Technologies for Basic Education ICT is primarily used in education as a tool to help learners develop their abilities, critical thinking, and creativity. It is also used to prepare tests and presentations using digital slides. ICT still needs to be adopted while applying suitable teaching methodologies, even after many of the practical, educational, and pedagogical constraints have been addressed. Numerous studies have shown that when used properly, technology is typically appropriate in learning environments focused on learners, promoting cooperative learning, using a constructivist approach, and problem-based learning to actively involve the learner in the process of acquiring knowledge. The use of ICT may be restricted, its outcomes may be questioned, and attention may be diverted towards more traditional techniques, regarding the use of ICT as redundant, if the instructional materials and practices are not focused on these strategies.

According to Livari et al. (2020), in order to suit the needs of the younger generation and their usage of digital technology, schools and children's education need to undergo significant digital transformations. Furthermore, as a consequence of the COVID-19 epidemic, the majority of elementary and secondary schools now incorporate technology into their teaching and learning (Livari, Sharma, & Ventä-Olkkonen, 2020:7). Equipping teachers with digital skills (do and be) to deal with native digital learners; preparing learners with the technical, cognitive, social, and emotional skills required for 21st-century learning and work; and implementing organisational processes and practices that align with new social and work relationships are all components of a holistic digital transformation toward Education 4.0.

Educational software is one of the key technological forces behind the digital transformation of education. A methodology based on drivers and innovation indicators is presented by Barbosa & Souza (2021:3) to direct the creation and assessment of educational software. These technical and pedagogical factors are linked to knowledge and abilities for learners to participate in and contribute to the 4IR. A blend of hard and soft skills is necessary to be a leader and succeed professionally.

Educational institution organisation and teacher training programs must be regarded as part of the digital revolution in education. According to Goh and Abdul-Wahab (2020:160), instructors play an important role in learners' education and should be trained in new teaching strategies for digital learners in a digitalised environment. Educational institutions, on the other hand, must reject the traditional method of knowledge transmission, grant instructors autonomy, experiment with new pedagogies for learners, and enable learners to establish their own learning pace, all with the help of technology.

Education 4.0, as defined by the United Nations Sustainable Development Goals (SDG), aims to prepare learners for 21st-century learning and jobs. The green economy, which encompasses the low-carbon economy and green employment, is one of the primary initiatives for achieving the SDGs. The green economy encompasses the creation, consumption, and distribution of goods and services that help advance societal well-being. The green economy will not pose significant environmental difficulties for future generations. Furthermore, the green economy seeks to reduce carbon emissions in the climate, prepare people for severe weather, relieve poverty, and create jobs in neighbouring areas. Educational systems may be used as a tactical tool to achieve green economic objectives.

There is a greater need to increase educational outreach about the effects of the rapidly changing climate, the depletion of natural resources, and global challenges relating to

food security and human health as environmental concerns and awareness about these issues develop. The so-called "blue economy" is supported by these challenges and their potential for various ocean-related enterprises. The blue economy also calls for cutting-edge, multidisciplinary educational programs that integrate management, technical, and scientific knowledge more deeply.

Another significant problem facing this generation is reducing anthropogenic contributions to climate change. According to UNESCO, education is a crucial component in addressing several urgent societal concerns, such as, for instance, addressing the causes and effects of climate change and encouraging attitudes and behaviours to support more environmentally sustainable lifestyles.

Environmental education's incorporation into school curricula is one of the tactics used by numerous nations to raise awareness and knowledge about climate change. Environmental education encompasses methods and resources that strengthen and ground environmental attitudes, awareness, knowledge, and skills so individuals can act and make decisions more sustainably (Monroe & Krasny, 2016:12). According to a study by Livari et al. (2020), high-quality educational technology can improve kids' ability to learn and their skills. Computers, mobile devices, tablets, and online instructional content are all used with digital technology to develop these improved skills. The study added that learners who had trouble focusing on class due to noise benefited more from distance learning. Additionally, it was observed that teachers affirm the advantages of educational technology for basic education learning and teaching methods.

2.12 Summary

This chapter offered a comprehensive analysis of the scholarly material that has already been published about digitization in schools on a global, regional, and national level. From the literature review, it is clear that ICT plays an important role in education. Schools located in urban areas have advantages in terms of getting ICT resources as compared

to schools in rural areas. The advantages, difficulties, and barriers associated with using ICT for teaching and learning in South Africa were also covered in this chapter. The research approach is discussed in the following chapter.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter focuses on the study's methodology and research strategy. According to the researcher, a good research design and methodology develop, address, and achieve the study's goals. Therefore, descriptive research was used in the study. Kothari (2004) defined a descriptive research approach as an approach where a researcher assesses the current state of an issue or circumstance. The researcher does not influence a scenario; instead, they look at what is or has happened. In contrast, an analytical research approach critically evaluates the information and facts already known to identify a problem's solution. Instead of using experimental research methods, the researcher chose a descriptive research approach instead of an analytical one as the study explores the influence of digital transformation in the basic education system of disadvantaged schools and ICT challenges in under-resourced high schools in the Khayelitsha Township.

3.2 Empirical Case Study

Township high schools in Khayelitsha are the schools that contributed the data. South Africa's Western Cape Province contains the Township of Khayelitsha. In order to provide housing for residents of Cape Flats informal settlements, Khayelitsha Township was founded in 1983. After its proclamation, Khayelitsha expanded swiftly. In the 1990s, Eastern Cape migrants who had previously been discouraged by inflow control arrived in quest of employment. It is one of the townships with poor infrastructure and technology and is primarily populated by isiXhosa-speaking individuals. It is one of the locations with a lot of unemployment and poverty. Four secondary schools were selected from the Metro East district for the study, with four educators taken from each school along with the four principals. Due to the extreme poverty of the area's people, every school in the study area falls within Quintile One-Three, the Department of Basic Education's classification

category for non-fee-paying schools. In this circuit, there are no private or independent schools that are privately owned, managed, and funded.

All four schools enrolled learners from Grades 8 to 12. On average, each school has 25 classes, with each class designed to accommodate only 30 learners. Due to the influx of residents into informal settlements, all the schools have enrolled more learners, although they do not have enough classrooms. Consequently, each class has ended up with a ratio of 1 teacher to +/- 45 learners. With no social distancing being practiced during COVID, schools had to operate on a rotational basis, significantly impacting learners' performance. The commonality in these schools was the old classrooms, no telephone lines due to cable theft and break-ins, wireless connection phones, no air conditioning, and a lack of computer devices or computer laboratories. The schools are under construction and are expected to have more classrooms and computer laboratories at the end of the project.

All former junior secondary schools in South Africa were compelled to restructure their grade structure to begin with grade 8 and continue through grade 12, since the education department demanded uniformity across all high schools there. In the 2020–2025 strategic plan, this transition was gradually phased in at all schools. In addition, the case study school changed its grades after 2015 to comply with the demands of the department of education. As an agency of the state, the Western Cape Education Department (WCED) performs its responsibilities per the concurrent legislative authority granted by the Constitution to provincial legislatures and parliament to govern education at the different levels, excluding tertiary-level education. The department will start, grow, and improve interventions over the five-year term to support the strategic priorities, primarily focused on the learner's ecosystem and ability to maximise performance. The department has acknowledged that without ensuring the efficiency of the entire educational ecosystem, academic and other learner performance indicators will be negatively impacted by a disempowering fiscal reality and crippling budget cuts in an education system that already bears the brunt of social unrest and discontent.



Figure 3.1: Map illustrating selected schools around Khayelitsha. Source: uploaded by Lucy Rodina (2016).

Some of these learners in township schools are interested in careers in information technology or website design, but these topics are not covered in their curriculum. ICT can provide equitable access to education, according to Ng'ambi et al. (2016:845), because it enables everyone to access digital educational resources from anywhere. Remote rural schools with ICT connectivity are included in this accessibility. However, Ng'ambi et al. (2016) contend that rural learners have difficulties once they enrol in universities because they usually lack digital abilities.

They have the problem of learning digital skills while juggling their academic work simultaneously because lessons are presented in a style that necessitates the use of digital technologies. WhatsApp is increasingly being used as a medium for education and learning. While learners in suburban and rural schools must contend with the issues listed above, learners in urban schools benefit from digital tools. Using interactive ICT platforms like YouTube, LinkedIn, and e-learning, they can communicate with individuals worldwide.

They have access to high-quality study materials as a result, and the relationships and attitudes between teachers and learners improve, leading to better performance (Duffett, 2017:15; Lindberg et al., 2017:123). According to Mesfin et al. (2018), urban schools at all levels have safe computer labs with internet connections and offer computer studies that teach their learners computer skills. Mathevula and Uwizeyimana (2014:1089) argue

that although schools in urban areas have access to ICTs like computers, the Internet, and interactive whiteboards, they still need training to incorporate these ICTs into the curriculum. ICT integration and proper application improve teaching and learning. It generates a range of cutting-edge pedagogical techniques that can benefit 13 schools. For instance, teachers can employ mathematical tools to boost learners' digital and arithmetic skills. Through discussion blogs, learners may also exchange knowledge. These pedagogical techniques can aid in the improvement of learners' communication, problem-solving, knowledge, and many other skills. Despite having access to ICTs, urban schools are not incorporating these into their curricula (Mathipa & Mukhari, 2014:1213). Teachers with advanced training in software development work in urban schools; these teachers are few in rural schools, nevertheless.

Given that one of the most in-demand businesses in the twenty-first century is information technology, this is helpful for urban learners. As a result, these learners can learn these abilities at an early age, and by the time they enroll in college, they know enough about programming to enroll in a software programming course. Additionally, it can imply that they have little possibility of finding work. With the introduction of the Teacher Laptop Initiative (TLI), which intends to provide teachers in public schools with computers, the South African government has begun tackling the digital divide problem.

According to Mathevula and Uwizeyimana (2014:1090), this program was initiated by the former minister of education, Naledi Pandor, but it has not been implemented correctly in all South African government schools. However, the TLI will not alleviate rural schools' problems because teachers' access to laptops does not guarantee that they will have internet access and ICT knowledge or permit learners to use them for learning. Even though South Africa has embarked on a process to address the digital divide issue, there is little evidence that learners from under-resourced communities are using the benefits of digital tools for learning.

3.3 Research approach

Various research methods are discussed among researchers; the most common methods

used in business studies are qualitative, quantitative, and mixed methods (Creswell & Creswell, 2018:41; Bell & Waters, 2018:24). The qualitative method is based on words, assertions, and sometimes visuals, while the quantitative approach is based on statistics and statistical analysis (Kumar, 2018:47:14). Mixed methods combine both qualitative and quantitative methods (McKim, 2017:202; Creswell & Creswell, 2018:41; Dawadi, Shrestha, & Giri, 2021:27). This study used the mixed methods research approach as it allowed the researchers to combine both inductive and deductive thinking, using more than one research method to address a research problem (Sekaran, 2016:106; McKim, 2017:202; Poth & Munce, 2020:56). The disadvantage of the mixed research method is that it complicates the research design and necessitates a clear presentation to allow readers to sort out its various components (Creswell & Creswell, 2018:41).

3.4 Research paradigm

Research paradigms are frameworks that, through their principles and assumptions, govern scientific findings. Understanding paradigms aids in illuminating the quality of research results that support scientific investigations as well as identifying gaps in the generation of good evidence (Park, Konge, & Artino, 2020:690). Drawing from Khaldi (2017:16), the paradigm adopted for this research is a pattern, set of beliefs, and agreement demonstrating the meaning of data and how it is to be collected and interpreted.

Ma (2015:567) classified paradigms into three types: interpretivism, critical thinking, and positivism. Interpretivism is a research paradigm that contends that understanding the beliefs, reasoning, and motives of people in a scenario is critical to deciphering the meaning of study data gathered around a phenomenon (Nickerson, 2023). Positivism is a research paradigm that adheres to the view that only the factual knowledge that is gained through measurements and observations is trustworthy (Gemma, 2018:42). Post-positivism, on the other hand, follows the same principles as positivism but allows for more interaction between participants and the researcher (Taylor & Medina, 2011:140). The critical research paradigm is related to society and whose purpose is to justify and criticize the existing societal issues or status quo so as to provide alternative knowledge

and to make society a better place (Gemma, 2018:43).

As part of its mixed-methods approach, this research used both an interpretative and positivist perspective (presented in the previous section). A mixed-methods methodology has many advantages for approaching complicated research challenges since it blends both interpretivism and post-positivism perspectives, interweaving quantitative and qualitative data in such a manner that research concerns are effectively explained (Fetters, 2016:4; Dawadi, Shrestha, & Giri, 2021:27). The interpretivist technique was chosen because the researcher wished to move beyond empirical data collection. The researcher was interested not just in the objective facts of the sampled community but also in the sampled population's subjective ideas, attitudes, feelings, and values. The researcher chose the positivist technique because she wanted to be an objective analyst, disassociating herself from personal beliefs and working independently.

3.5 Research design

A research design is defined as a strategy that is taken to answer the research questions using empirical data (McCombes, 2023). Surveys allow one to collect data about opinions, behaviours, experiences, and characteristics by asking people directly (McCombes, 2023). A survey research design was found to be suitable for this study and is defined as the collection of data from a sample of participants through their responses to questions (Check & Schutt, 2012:160). Surveys can use qualitative research approaches (using open-ended interviews), quantitative research strategies (using questionnaires with dichotomous responses), or both strategies (mixed methods) (Ponto, 2015:168). The survey research design was therefore suitable for this research, as this study utilises a mixed-methods research approach. Because this research used a mixed-methods sampling methodology, open-ended and closed-ended questionnaires were employed to gather data.

3.6 Demarcation

This study interviewed teachers, principals, and learners about digital transformation's role in basic education. The study sample was selected from the Western Cape Region,

limited to Khayelitsha Township, based on the inclusion criteria of the schools being economically disadvantaged. The learners were also from the schools that were selected.

3.7 Data Collection

3.7.1 Population

The consideration of a suitable population to be studied is vital in conducting research studies. Accordingly, Bryman & Bell (2011:176) advise that the population to be studied is the universe of units from which a sample is chosen. Therefore, this study's target population is comprised of principals, teachers, and learners in Khayelitsha Township high schools.

Principals

The school leaders were also important stakeholders in the study, as they were responsible for setting the vision for the digital transformation and providing leadership and support. There was a need to assess the study on how the digital transformation is impacting the school leaders' decision-making, communication, and leadership style.

Teachers

The teachers at the school were also important stakeholders in the study, as they were responsible for implementing the digital transformation and supporting the learners. There was a need to assess how the digital transformation is impacting the teachers' workload, teaching methods, and professional development.

Learners

Learners at the schools were the primary focus of the study, as they were the ones who were most directly affected by the digital transformation. There was a need to assess the study on how the digital transformation will impact the learner's learning, engagement, and access to education.

A population or target population for this research study will simplify the results found from observations of its sample. The samples' race, gender, or qualifications do not affect this study's authenticity, as these demographic characteristics are not prerequisites for the study.

3.7.2 Sampling and sample size

This study used non-probability sampling methods as the researcher selected samples based on subjective judgment rather than random selection (Saunders, Lewis, & Thornhill, 2019:315). Two non-probability sampling methods, (1) purposive sampling and (2) convenience sampling, were used. Purposive sampling is a non-probability sampling strategy in which the researcher selects a sample from the population to participate in the survey based on their own assessment (Campbell et al., 2020:653). Convenience sampling is a non-probability sampling method that selects a sample because of its availability at a given time, geographical proximity, or willingness to participate in the research (Andrade, 2021:87).

In this study, the four schools were purposefully selected based on location and whether they were disadvantaged or not. Principals and teachers were collectively referred to as "educators" in this study (n = 16). Four principals (n = 1 from each school) were also purposively selected as they met the researcher's inclusion criteria of being school principals, while 12 teachers (n = 3 from each school) were conveniently sampled. The purpose of convenience sampling was to select teachers who were readily available and able to dedicate their time to participate in this survey. Lastly, learners (16) who were between 16 and 20 were purposefully and conveniently selected from the four schools that were sampled.

3.7.3 Data collection Instrument

A questionnaire is a data collection tool consisting of questions and other prompts designed to collect information from respondents (Yeong et al., 2018:2711). Various types of questionnaires are adopted in research studies, namely open-ended and closed-ended questionnaires (Sage Publications, 2020:183; Baburajan et al., 2022:2). Open-ended questions require the respondent to explain the answer in a short essay or paragraph, while closed-ended questions provide the respondent with options to choose a response (Bhandari, 2023). Close-ended questions are often phrased as statement questions requiring a Likert scale response (Bhandari, 2023).

If a survey has a questionnaire with scalable answers, that is a quantitative survey; if the survey has descriptive questions that are open-ended, it is a qualitative survey; and if the survey has both scalable and open-ended questions, it is a mixed-method survey (Zohrabi, 2013:254; George & Merkus, 2022). As this research took a mixed methods approach, the questionnaire for educators had open-ended questions in four sections (Sections A, B, C, and D) (Appendix B), while the questionnaire for learners had both dichotomous closed-ended and open-ended questions in three sections (Sections A, B, and C) (Appendix C).

3.7.4 Field work

The self-administered survey approach was used to collect data from the educators (teachers and principals) using an open-ended questionnaire. A self-administered interview takes the form of a standardized protocol that has clear instructions and open questions that guide the participants through the process of producing their own responses without the need for a researcher or trained interviewer to be present (Matsuo, 2017:644). Questionnaires were hand-delivered to each educator at their workplaces after acquiring the necessary approvals from the participating school principals and signed consent forms from the participants. Hand-distributing the questions allowed us to avoid the delays associated with mailing questionnaires while also building a good relationship with the respondents.

For the learners, questionnaires were administered by the researcher in order to guide the learners so that they could understand the questions and give appropriate responses. The ethical protocols described in Section 3.10 were followed.

3.8 Data analysis

The goal of data analysis is to organise, arrange, and extract meaning from the collected data (Kabir, 2016:277). An understanding of participants' responses collected from data collection instruments is a challenge faced by most business researchers. Thus, in this

study, so as not to face a similar issue, a step-by-step guideline on how data collected from respondents will be coded and analysed will be based on the overview of stages of data analysis.

Stage 1: Raw data were entered in MS Excel and represented according to the respondents' words.

Stage 2: Data integrity was checked, which involved confirming that the collected data contained information that follows a set of research guidelines and standards and that there is no misinformation or bias.

Stage 3: Data editing was done to check for information consistency, completeness, and legibility, thus making the data suitable for analysis.

Stage 5: The MS Excel data file was stored.

Stage 6: The data was then analysed.

Data from the Microsoft Excel spreadsheet were imported into the Statistical Package for the Social Sciences (SPSS) application (Ver. 25, 2017) to construct basic tables and graphs, particularly for demographic data. A qualitative descriptive technique was used to give plain accounts of the participants' experiences (Sandelowski, 2010:78), especially when little is known about the issue under investigation (Doyle et al., 2020:444). A qualitative descriptive approach was used for this study because it recognizes the subjective aspect of the topic being researched as well as the various experiences of the participants, which are presented in a form that directly mirrors the language used in the research questions (Bradshaw, Atkinson, & Doody, 2017:2; Doyle et al., 2020:444). The usual replies were then explored with reference to literature based on the responses.

3.9 Measures to ensure quality control of the data collected

3.9.1 Selection of survey institution

As the survey concentrated on educators and learners, these were sampled as they are knowledgeable about the topic being investigated.

3.9.2 Running tests well ahead of time

Testing is an essential part of quality assurance. Testing also provides a chance to get any comments that will help assure data quality. This research conducted a pilot study to assess the questionnaire's reliability and practicality. A pilot study is a small-scale preliminary study that helps researchers decide how to conduct a large-scale research effort (Masunga, 2019:38). Before distributing the surveys, the researcher conducted a pilot test on five random co-workers and five learners to see whether the participants could grasp the survey questions. This technique assisted in identifying areas that required improvement in queries that came across as confusing or imprecise. Fortunately, the pilot study participants understood the questions and could answer them for the researcher.

3.9.3 Academic check-ups

Regular checks with supervisors and other academic professionals The supervisor approved the sampling design, and the researcher also got some external assistance from other academics and statisticians who ensured that the research was of high quality.

3.9.4 Using a research instrument that has been used in previous surveys

Quality assurance was also achieved by using a research instrument that was similar to previous published studies.

3.9.5 Standardisation of sampling

The educators who participated in the survey all received the same questionnaire with the same questions. The learners were administered the same questions, and the process of questionnaire administration was the same.

3.10 Validity of the results

3.10.1 Credibility

The credibility of qualitative research results determines whether they are trustworthy or plausible in the eyes of the respondents. Because the goal of qualitative research, from this perspective, is to grasp the phenomena of interest based on the information supplied

by the participants, only the participants can appropriately judge the trustworthiness of the results.

3.10.2 Transferability

Transferability refers to the extent to which the results of qualitative research may be used in multiple settings. The study's conclusions were made more transferable by clearly explaining the research setup.

3.10.3 Dependability

The concept of dependability highlights the requirement for the researcher to account for the constantly changing environment in which research takes place. The research study is in charge of outlining the modifications and how they influenced how the research approached the investigation.

3.10.4 Confirmability

Confirmability refers to the degree to which qualitative results may be checked or validated by others. There are several techniques for boosting confirmability. Throughout the inquiry, the researcher may keep track of the strategies used to validate and recheck the data.

3.11 Limitations of the research

Lack of Previous Studies

There are limited articles or reviews on the perspective that digital tools should be introduced more profoundly in basic education in disadvantaged communities. Most reviews or articles focus on the resources provided or how to improve the skill set of teachers in these schools. Few articles or journal papers reviewed the concept of digital transformation tools in basic education, as this is a grey area in this country.

Sample Size

The sample size comprised 16 educators and 16 learners who were purposefully selected and agreed to participate in the research. It can be argued that focusing only on a small

sample size of individuals has the drawback of making it difficult to generalize the research findings to a larger population. Findings cannot be assumed to fit into all marginalised schools in the Western Cape. It would be preferable to examine a very large population to give more accurate results and draw conclusions that reflect the entire population. Achievement of this is, however, limited by resources and time. The findings, though, give a great indication of the conditions and possibilities for digital education amongst schools in the Metro East District, Western Cape, and give insight into the educational development opportunities in the schools.

3.12 Ethical considerations

The research was carried out in accordance with the research ethical guidelines set by Cape Peninsula University's Faculty of Business and Management Sciences. Ethics are vital in research studies, and ethical principles reflect views on behavioural morals and ethical orientations and standards.

Therefore, drawing from Saunders, Lewis and Thornhill (2016:158) and Neuman (2014:147), the following sets of standards will be adhered to achieve the aim and objectives of this study:

- Informed consent: the participants were briefed on the topic and their willingness to consent to participate in the study. The principals and teachers at the high schools have signed a letter of consent and briefing. As a result, the respondents gave the researcher their full approval for them to participate in the study. The informed consent indicates that the participants have the right to refuse the study and withdraw at any moment to ensure the validity of the study.
- Furthermore, the participants' confidentiality and information were protected by providing them with the option to remain anonymous or reflect on their details. This was achieved by using "Participant 1, 2, 3,..., 16" to represent the individual participants rather than their names. The names of the schools were also omitted from this study.
- Participant's right to privacy: The participant's privacy was prioritized and complied with the participant's freedom of choice to participate.
- Protection from harm: Measures were in place to ensure the participants were not

harmful by participating in the study by obtaining informed consent, the right to remain anonymous, clearly explaining the research study's objectives, and affording the participants the right to withdraw from the study at any time. To avoid a situation in which a third party may get access to the researcher's data, the researcher additionally made an effort to physically collect all completed surveys from the respondents' hands.

- Prior to starting the research, the university issued the researcher a certificate of ethics clearance.

3.13 Summary

This chapter presents the methodology used in this study. This study used a mixed-methods research approach, which allowed the researcher to combine both inductive and deductive thinking to address the research problem. A survey research design was found to be suitable for this study, as surveys can use qualitative research approaches (using open-ended interviews), quantitative research strategies (using questionnaires with dichotomous responses), or both strategies (mixed methods). The target population consisted of educators and learners in four Khayelitsha Township high schools that were purposefully selected based on the inclusion criteria of the schools being economically disadvantaged. Sixteen educators and sixteen learners were purposefully and conveniently selected to participate in the study. The self-administered survey approach was used to collect data from the educators using an open-ended questionnaire, and open-ended and closed-ended questionnaires were administered by the researcher to the learners. Data were entered into an MS Excel spreadsheet and imported into SPSS to produce basic tables and graphs, particularly for demographic details. Ethical protocols were followed in the collection of data. The research findings of this study are presented and discussed in the next chapter.

CHAPTER 4

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter presents the results and discusses the findings. The study aimed to explore the influence of digital transformation on the basic education systems of disadvantaged schools in the Western Cape. To achieve this aim and a set of objectives that add up to this aim, questionnaires and surveys presented in the previous chapter provided information that will be presented and discussed in the previous chapter and generated data that will be presented and analysed in this chapter. A mixed-methods approach was utilised for this study, as the questionnaires that were used in this survey had both qualitative and quantitative questions. The first section of this chapter presents the demographic information for the educators, and the data in line with the research objectives will be presented next. The later sections will present data from the learners.

4.2 Response rate

The response rate for questionnaires that were given to educators was 100%. The response rate of the questionnaires that were administered to learners was also 100%. The high response rate is commendable, as it gives confidence in the data collected. Already, the study has a limitation of sample size; having a low response rate would make the conclusions difficult to draw as they would be based on a very small sample because respondents did not overwhelmingly participate in the survey.

Attitude towards research influences individuals' willingness to participate in research, which affects the response rate (Lavidas et al., 2022:2). An altruistic motivation can be considered when participants take part in the research as they consider their answers to be vital for the achievement of a good purpose (Petrovcic, Petric, & Manfreda, 2016:321). When individuals have an altruistic motivation, the response rate will be high (Lavidas et

al., 2022:2). Participants may also be interested in the subject of the research, which is an essential factor for increasing the response rate for any research (Lavidas et al., 2022:2). This was confirmed by Park et al. (2019:1), who stated that people are more likely to participate in research when its topic is related to their interests. This study looks at ICT adoption in education, and the high response rate could reflect the interest that people have in the subject.

4.3 Educator Demographic details

4.3.1 Age of respondents

The participants' ages ranged from 30 to 50 years old. One participant was under 30, 8 were between 31 and 35, 3 were between 36 and 40, 2 were between 41 and 45, and 2 were between 46 and 50. The age range that had the highest occurrence was the 31–35 age range, which constituted 50% of the respondents, as shown in Table 4.1.

Table 4.1: Respondents' age

Age	No. of educators	Percentage
< 30	1	6.25
31–35	8	50.00
36–40	3	18.75
41–45	2	12.50
46–50	2	12.50

Workplace developments in the contemporary world have resulted in increased skill, knowledge, and ability requirements for employees (Lee, 2009:130). The majority of employees currently use a computer linked to the Internet or some other kind of device and technology at work, and this number is likely to expand, as is the extent and

complexity of technology. The increasing speed of technological progress, as well as the move to knowledge-based economies, will boost the need for ICT-savvy instructors. This means that older instructors who may not have been exposed to these ICT devices in their curriculum would need to participate in ongoing training and retraining initiatives in order to stay competitive in the school system. Despite these age-related changes in ability, research shows that older persons may acquire new skills, however it takes them longer than younger ones and requires practice and environmental assistance (Lee et al., 2009:131).

4.3.2 Gender of educators

Out of 16 participants, the majority (10) were female, constituting 62.5% of the respondents, and the remainder (6) were male, who constituted 37.5% of the respondents (Fig. 4.1).

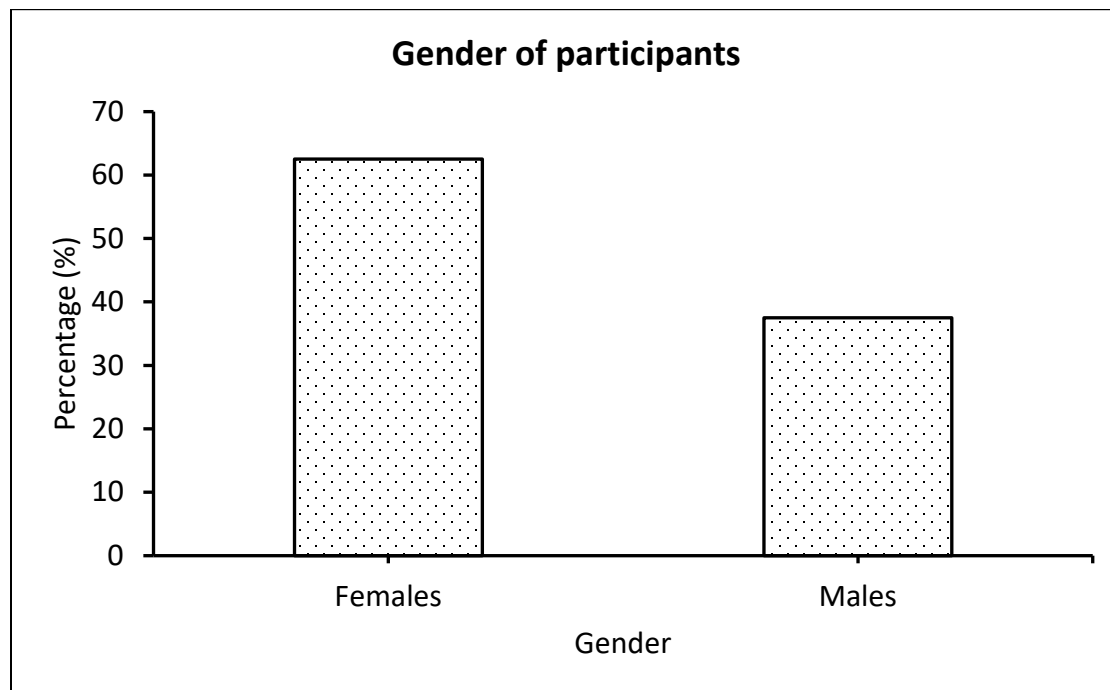


Figure 4.1: Gender of educators

This information is essential as it helps to understand which group is dominant in the school: male or female. Many factors contribute to gender inequality globally, and gender bias may be encountered in the workplace (Martnez et al., 2021:1). Many individuals

make erroneous judgments and create preconceptions and prejudices as a result of cognitive biases, according to Güngör & Biernat (2009:232; Heilman, 2012:120). In job applications, for example, female candidates are perceived to be less devoted, less self-confident, and less likely to remain on the job than male applicants. Gender bias is one of the primary causes of discrimination in recruiting and promoting individuals with equal credentials and qualities, according to the International Labour Organisation. It has been more than two decades since a democratically elected government in South Africa was formed with clear goals to confront and correct historical inequalities. As a response, the government enacted laws and institutional tools to address the historical consequences of a highly unequal society, notably the Employment Equity Act in 1998, since males formerly controlled numerous businesses. As a consequence, there was a trend toward equality, and the number of female working increased. Despite legal and institutional systems, female continue to confront the reality of a gender-biased society and labour market in a variety of areas. Results from this study, however, show the dominance of female, which supports national, regional, and global calls that support the empowerment of female in workplaces.

4.3.3 Employment status of educators

The participants' employment status was determined by asking them this question. The majority (12) were permanent employees constituting 75% of the respondents, and the remainder (4) were temporary employees, constituting 25% of the respondents (Fig. 4.2).

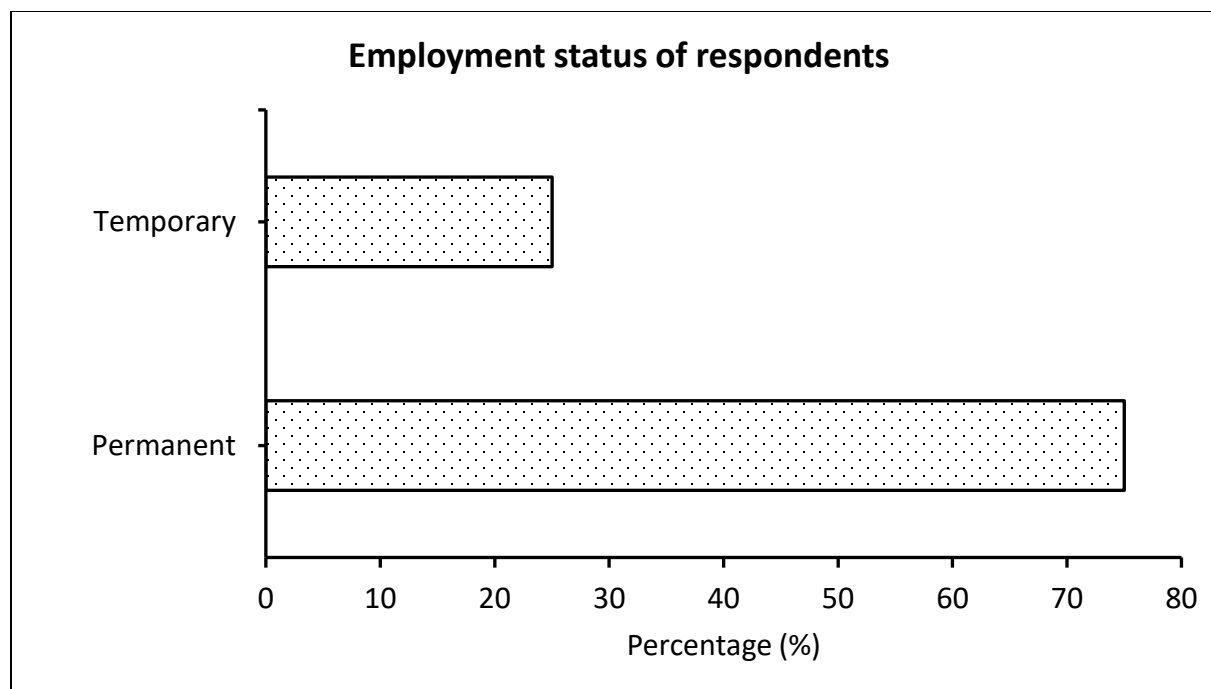


Figure 4.2: Employment status of educators

This is advantageous for schools since permanent personnel tend to remain in their jobs longer than temporary ones. Temporary teachers, on the other hand, play critical roles in replacing and covering for regular instructors on leave. Furthermore, numerous temporary instructors have been engaged in recent years to offer extra, special activities for learners that have been sponsored by fixed-term government initiatives such as the National Partnerships.

4.3.4 Teaching experience

This question aimed to find out how long the educators had been teaching and how well-versed they were in the institution. Fig. 4.3 shows that 1 participant has been in the profession for fewer than two years, 5 participants have been in the profession for 2-3 years as well as for 4-5 years, 3 participants have been in the profession for 6-7 years, and 2 participants have been in the profession for 8 years. Most teachers in this study had a combined teaching experience of between 2 and 4 years, constituting a combined percentage of 62.50% of the respondents (Fig. 4.3).

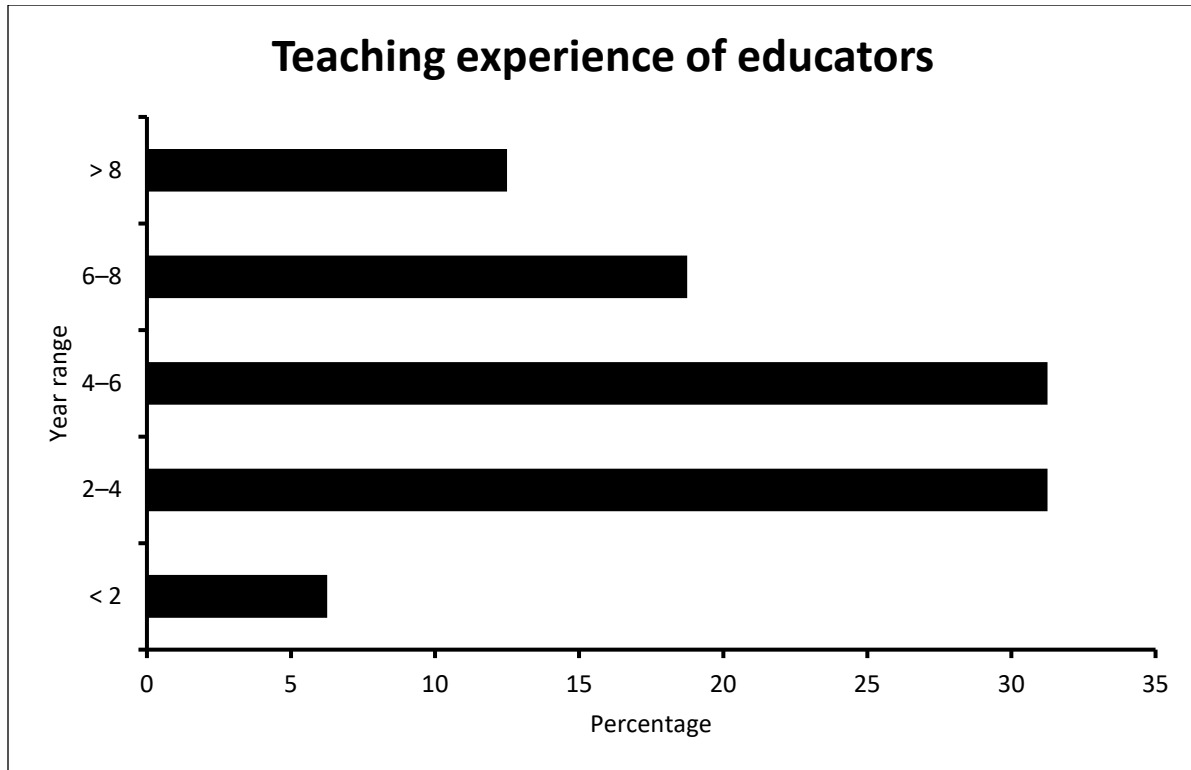


Figure 4.3: Teaching experience of educators

This information is crucial because it sheds light on the educators' classroom experiences. Most participants have not been in the field for very long; hence, they lack extensive teaching backgrounds. However, given that they have recently graduated from college and are still eager to learn new skills and impart them to learners, this can work to their benefit. In addition, new, young staff members can be advantageous for the school since they might have innovative ideas to enhance its educational procedures, such as a digital technology curriculum.

4.4 Does the school have computer studies?

Respondents were questioned about whether they provide their learners with digital education to give them ICT skills. There were two choices, "yes" and "no," that were expected for this question. All the educators said they do not provide their learners with such lessons. This can be a result of the school's poor computer and Internet access. On

whether any learners own a laptop, none of the learners were reported to own a laptop. Due to intimate familiarity with the neighbourhood, the researcher anticipated this. Most households cannot afford laptops because most parents are not working.

Of concern is the department of education's failure to help teachers adapt to and implement digital transformation. Regardless of the availability of ICT equipment at the respective schools, the teachers should receive adequate training so that when they receive the ICT equipment through government programs or donations, time is not wasted training the teachers, as they would have been equipped with relevant training prior to receiving the ICT equipment. The importance of ICT was felt when the COVID-19 pandemic hit the global world, where most sectors switched to computers and the Internet to run their operations (Iivari, Sharma, & Ventä-Olkkonen, 2020:3). The education sector was also one of the primary consumers of technology, where lessons, assignments, and other educational activities were conducted online through Zoom, MS Teams, Skype, and others on a computer, laptop, or smartphone (Polikoff, Saavedra, & Korn, 2020:3). During the pandemic, schools were closed for a very long time. Teachers, schools, and learners who had access to ICT managed to continue with their classes online while the poor schools and learners were at a standstill during the pandemic. This disparity contributes significantly to achievement gaps between learners, mainly based on their economic status. Findings from this study show that the digital divide plays out in real-time during pandemics in ways that are sure to lead to unequal adverse effects on already disadvantaged learners (Polikoff, Saavedra, & Korn, 2020:3).

4.5 Educators' understanding of digital transformation and technology

All the educators exhibited a basic understanding of digital transformation and technology and how they are crucial in the education sector, particularly in rural communities. Some of the responses showing an understanding of digital transformation and technology are below:

4.5.1 Understanding of digital transformation

Participant 2

"Digital transformation is the use of digital technology to create or modify an already existing procedure or process to meet the changes at school."

Participant 3

"Is a technical reformation to form more advanced technical processes in order to create new business techniques, cultures, and customer desires that will meet what a business and market require."

Participant 7

"This is the change from the manual use of things to a more artificial and computerized way of doing things, such as e-books instead of paper."

4.5.2 Understanding of technology

Participant 1

"Technology is embedded in the operations of all machines." "It is the continually developing result of accumulated knowledge and application of all techniques and skills."

Participant 7

"Technology nowadays has changed the lives of many South Africans." "Both children and old people can now communicate with people who are overseas via international video call with the use of tablets and laptops."

Participant 8

"Technology changes the way people do things, and it makes things easy, and learners understand things quickly, e.g., laptops, cell phones, iPads." "People share data on social media, e.g., Facebook and Instagram."

The overarching purpose of educational transformation is to generate learners who are equipped with ICT skills, knowledge, and competence to apply and employ in post secondary education (Gunter & Gunter, 2015). Teachers are unlikely to employ ICT resources and abilities in their classroom activities if they do not have access to them (Gunter & Gunter, 2015). Having ICT resources allows instructors to access a world outside of the classroom and enhance their service delivery (Aktaruzzaman, Shamim, & Clement et al., 2011). In this study, most teachers received training from various ICT government programs, mainly for the school management team. Some programs mentioned as examples by the teachers included ICT workshops and training solely for digital transformation, the use of ICT in learning, coding, and robotics, and the use of Microsoft in class and planning. In addition, WCED organised some ICT training or workshops for teachers at CTLI. WCED gave a school 500 tablets in 2017, and training was provided; however, due to theft and wear-and-tear, only 100 tablets to date still exist. Some teachers complained that there is no point in receiving this training when they have no ICT equipment to use with learners and they forget everything they would have been taught.

4.5.3 Contribution of digital transformation to education

All the teachers described how digital transformation can positively contribute to the curriculum of the learners and would use ICT to help schools transform, if given access to it. Some of their responses to that question are below:

Participant 1

"Technology always provides learners and teachers with easy information on computers." "With technology, learners do not always need to go to the library to get some information." "Learners use technology to become more engaged in the classroom."

Participant 5

"When learners are given an assignment, they are not only relying on the library." "They use their phones, and we take them to the school computer lab and work there."

Participant 6

"Every child is born with an inquisitive mind." Our resources and our preparedness do not fully give the learner such exposure. "Learners are quick to learn technology."

Participant 7

"Given ICT access, I will use it because it will assist in reaching lesson goals, you work faster, and learners can participate and do their own research independently and learn new things."

Participant 8

"Given ICT access, I will use it because my school is the most promising school; this transformation would bring great changes."

Participant 10

"Given ICT access, I will use it as it would make things easier and make it easier for learners to get help when they are not at school or home and when there is no teacher teaching independent learning."

Adoption of ICTs has the potential to greatly enhance the lives of rural learners. According to the United Nations Development Program, increased ICT use improves service delivery by enabling workers to concentrate on delivering services, enhancing access to basic services and knowledge exchange, and providing digital development for continuous improvement (Ruxwana, 2009). The adoption of ICT in rural schools also assists learners in developing a variety of practical knowledge skills and opportunities that may contribute to community socioeconomic development (Hamidi & Chavoshi, 2018:1053). ICT in education not only produces knowledge and skills for a more informed society, but it is also necessary for inducing certain knowledge reforms that change learners into productive citizens in society (Newby, Hite, & Mugimu, 2013:515; Pruet, Ang, & Farzin, 2016:1132). ICT fosters educational reform, enhances learners' abilities, and prepares learners for the global information economy (Eynon & Geniets, 2016:463).

In South Africa, ICT was introduced in the educational system to improve the quality of education as well as provide all teachers and learners with equitable educational opportunities (Zungu, 2022:30). In particular, previously disadvantaged schools were included in ICT programs so that they could fully participate in the education system (Mkhize & Davids, 2021:18). There is, however, still a long way to go before schools in general in South Africa reach the level of developed countries with regards to the integration of ICT (Zungu, 2022:30). Lack of infrastructure in schools, particularly for the marginalised, may be only the first stumbling block to the integration of ICT (Department of Basic Education, 2017). Nonetheless, digital transformation will potentially improve service delivery in marginalised schools and increase their pass rates.

4.6 Educators' plans for the full implementation of digital transformation

The educators exhibited a readiness to implement digital transformation in Khayelitsha schools. The only limitation at present is the unavailability of digital transformation tools, as explained by all respondents. Some of their responses to show the requirements for the implementation of digital transformation are below:

Participant 1

"As a school, we need this change in digital transformation as it will improve learning, but we need a lot of resources so that we can adapt to this change."

Participant 4

"Learners bring their own laptop and use mobile devices to assist more."

Participant 12

"All classrooms should have smart boards; we should have digital libraries, access to Wi-Fi in our areas of residence, and train teachers for efficiency."

Participant 14

"Funds to purchase equipment, training programs for learners and teachers, and a safe space to be able to work in a conducive environment even though the school is in the"

Township."

Participant 15

"The first issue would be addressing the accessibility issue, as most learners and teachers do not have access to technology." "Both teachers and learners need proper training on the use of technology in order to adapt faster."

Educators in Khayelitsha schools sampled demonstrated their readiness to integrate ICT in their classrooms. The lack of resources is the only limitation that prevents the teachers from fully utilising ICT. This has also been reported in other marginalised schools in South Africa by Nkula & Krauss (2014:254). A particular school only had three teachers, including the headmaster. This means that teachers are responsible for different grades, and teachers have learners of different grades in one class. Regardless of how extremely isolated the school is, the teachers also demonstrated readiness to utilise ICT technologies, as they believe that they can make the work easier by managing the classrooms and encouraging the learners to work independently (Nkula & Krauss, 2014:254).

4.7 Contribution of parents to digital transformation

Most teachers (88.89%) do not think parents can contribute financially to the digital transformation of the education sector. Parents could potentially contribute to the digital transformation by buying their children computers to use in school or paying fees that can cater to the purchase of ICT equipment. However, the socioeconomic status of parents makes this goal far from being achieved. Some responses that show how incapacitated the parents are in terms of contributing to the digital community are recorded below:

Participant 3

"Many parents in one area are middle-class workers." "It is already a struggle to pay for transport and to handle the school needs of their child; adding the technology in one mix will only make making ends meet."

Participant 4

"Technology costs a lot, and looking at the areas learners live in, if their parents were asked to pay for this, it would cause financial strain in many households."

Participant 7

"Parents hardly have money to pay for school's basic requirements." "Some learners come to school with hunger."

Participant 11

"By the look of things, many people are currently unemployed, and the development of Covid 19 has made things worse; other households do not receive any type of income."

Participant 12

"Not every learner's background is built on the foundation of financial stability." "Some learners come from homes where parents do not work and are waiting for them to prosper in life while they try to meet some ends."

For the successful integration of ICTs in schools, a triad between teachers, learners, and parents should positively interact and provide support (Matthee, Hattingh, & Weilbach, 2017:6). Parents are important stakeholders in ICT integration in schools. Attitudes toward technological integration in schools by parents are important for it to succeed. The negative attitudes of parents towards the implementation of technology in schools might influence their children's adoption of technology in schools (Matthee, Hattingh, & Weilbach, 2017:6). In this study, some teachers confirmed that parents could be able to support digital transformation in schools as they are able to maintain wearing expensive brands and paying for monthly services such as DSTV. The teacher further elaborated that it is all about attitude and priorities. Another teacher argued that if they can purchase smartphones for their children, they can purchase laptops for digital transformation. Nonetheless, the issue of resources cannot be ignored. Learners in the sampled schools come from families of low socioeconomic status and therefore might not be able to buy ICT gadgets to support their children. Parents, as stakeholders in education, can therefore give feedback on the practicalities and difficulties they experience with technology integration in schools. Not much research has been done in South Africa to

determine the role of parents in the integration of ICTs in schools.

4.8 Success of the digital transformation program

The digital transformation program is somewhere on the continuum between successful and unsuccessful. This is because some learners have smartphones, which can potentially be used for academic purposes. Some schools even have functional computer labs that support the digital transformation program. However, much still needs to be done to support schools that are struggling with implementing the digital transformation program.

The success of digital transformation programs depends on various stakeholders that include educators, learners, and the community (Matthee, Hattingh, & Weilbach, 2017:6). Further to this, government support plays a crucial role in supporting the infrastructure as well as funding for ICTs to be integrated in the schools. In Gauteng Province, owing to the many benefits of ICTs, the Gauteng Provincial Government invested R 724 million in the 2017–2018 period to support the integration of ICTs in secondary schools throughout the province (Msiza, Malatji, & Mphahlele, 2020:300). This kind of support should be implemented in other provinces so as to support the integration of ICTs in schools.

4.9 Results from Learners

Questions under this section focused on the learners' digital competence. Discussion points in this section were aggregated for related questions that had similar responses, although some questions were asked separately. The age of the learners ranged between 16 and 20 and had a balanced gender ratio. From this study, the employment status of the learners' parents was balanced between employed and unemployed (Fig. 4.4a), although most do not own an RDP house (Fig. 4.4b). It seems, however, that the learners come from poor backgrounds and rely on social grants (Fig. 4.4c).

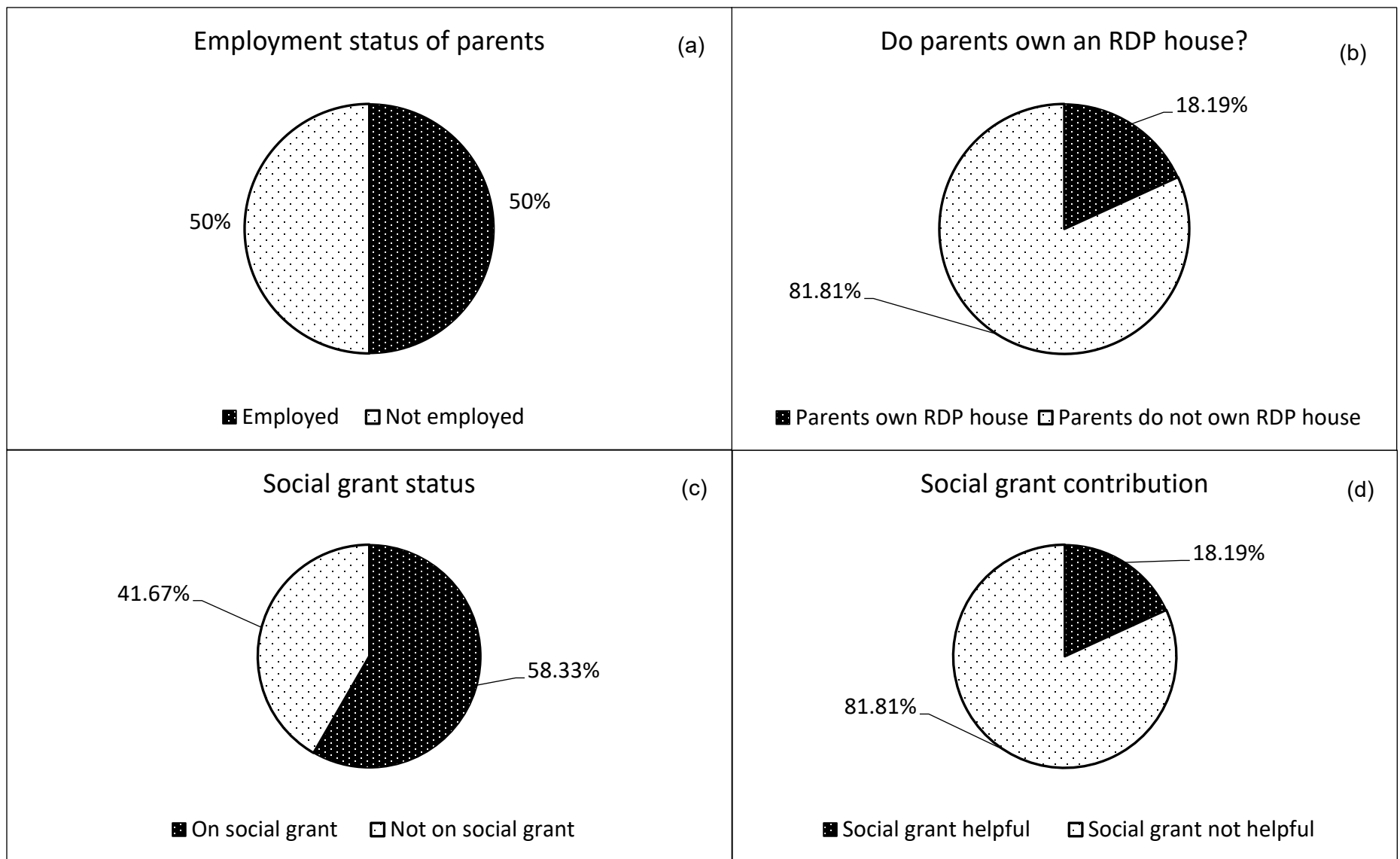


Figure 4.4 a-d: The socioeconomic status of learners based on the employment status of parents, social grants and RDP houses.

4.9.1 Are most of the school learner's computer literate?

The responses to the following query, "Yes" or "No," were crucial in determining the learners' ICT proficiency levels. Only 6.67% of respondents are computer savvy, while 93.33% say they are not (Fig. 4.5). This suggests that the majority of learners in schools lack ICT skills. ICT resources, such as computers, laptops, and the Internet, are not readily available, and with other ICT hardware, these learners may be weak in these abilities. Until they have access to ICTs, they cannot be given these skills. While it is feasible for a learner to acquire these skills independently, learners from underprivileged communities like Khayelitsha cannot do so because they come from minimal-income families that struggle to make ends meet.

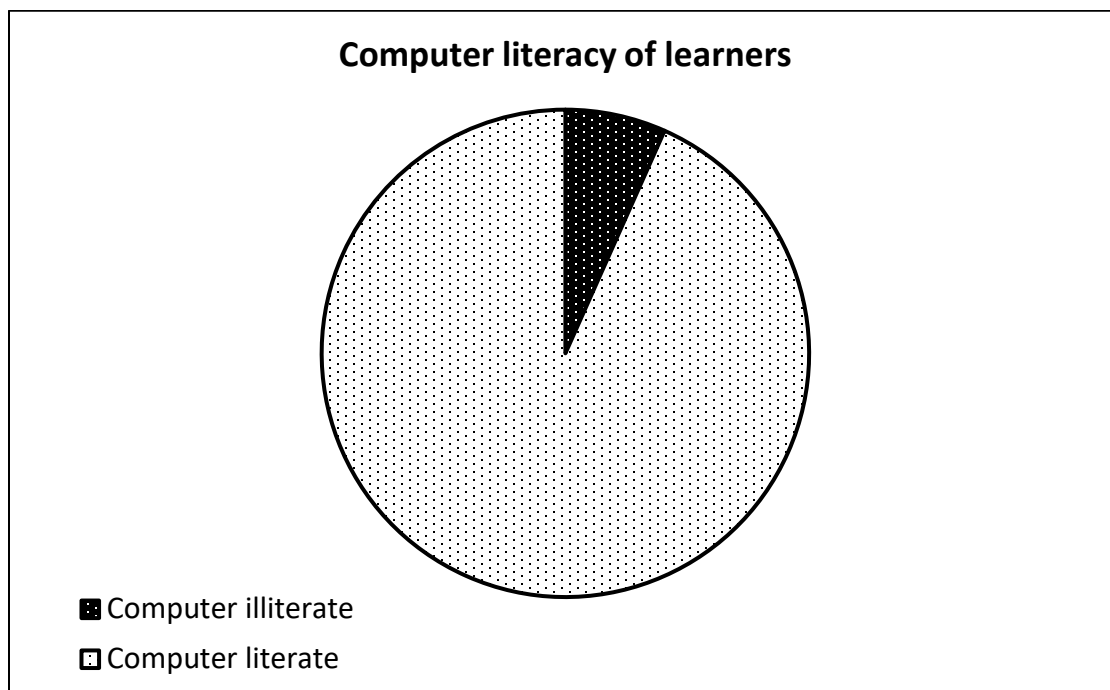


Figure 4.5: Computer literacy of learners

Results from this study corroborate Timmis and Muhuro's (2019), who recognized the challenges in accessing ICT tools in marginalised schools in South Africa. This is of concern as learners will struggle when they enrol in degree programs and diploma courses in institutions of higher learning where most learning activities are directly integrated with ICTs. Timmis & Muhuro (2019) further explained that this issue of digital

illiteracy will cascade to institutions of higher education, where the learner will experience challenges in utilising even basic ICT tools in their enrolled programs. Institutions of higher learning should recognize and acknowledge this issue and, upon enrolment, distribute forms whereby the learners will rate their ICT competence (Timmis & Muhuro, 2019). Bridging programs can then be implemented to capacitate learners from marginalised schools (Gamede, 2021:11).

4.9.2 Do most of your learner's own smartphones?

For this question, 14 (86.67%) interviewees said that learners had their own smartphones, while 2 (13.33%) do not own smartphones (Fig. 4.6).

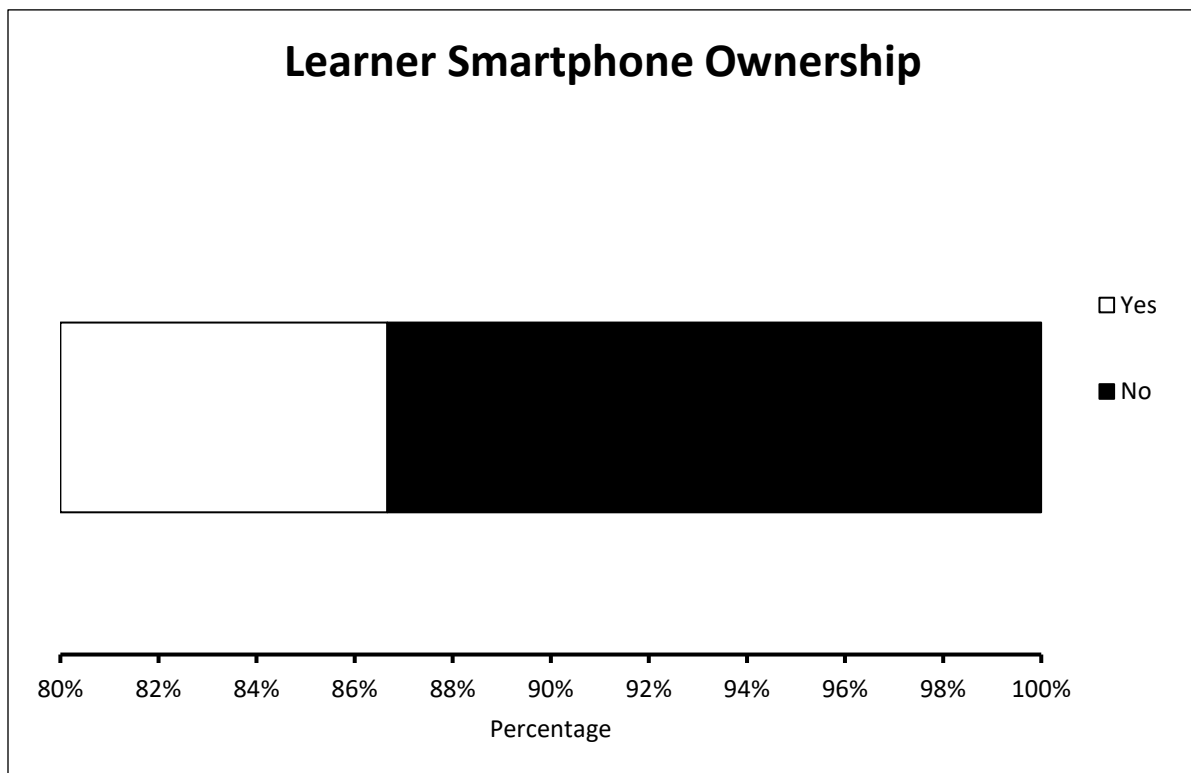


Figure 4.6: Learner smartphone ownership

A follow-up question was made to determine whether or not the learners use their smartphones for educational purposes. Every learners who owns a cell phone says they use it for social networking. learners are interested in social media and use it to communicate with their loved ones. They need to be taught how to utilise their smartphones for their academics as well, for instance, by setting up study groups where

they may exchange study tips or discuss academic difficulties with their teachers. Smartphones are already being used as learning tools in other schools in South Africa as they help to obtain information. Tapping the existing technology of smartphones for education purposes thus poses a great opportunity for providing learning resources that can reach out even to youth in marginalised schools. In some schools, learners are generally discouraged from bringing smartphones to school on grounds of theft and personal safety.

4.9.3 Implementation of digital transformation at the school

This question was asked to determine whether there has been any implementation of digital transformation at the school. Most learners, 81.81%, have not experienced any digital transformation at the school, while 18.19% have experienced a digital transformation at the school (Fig. 4.7).

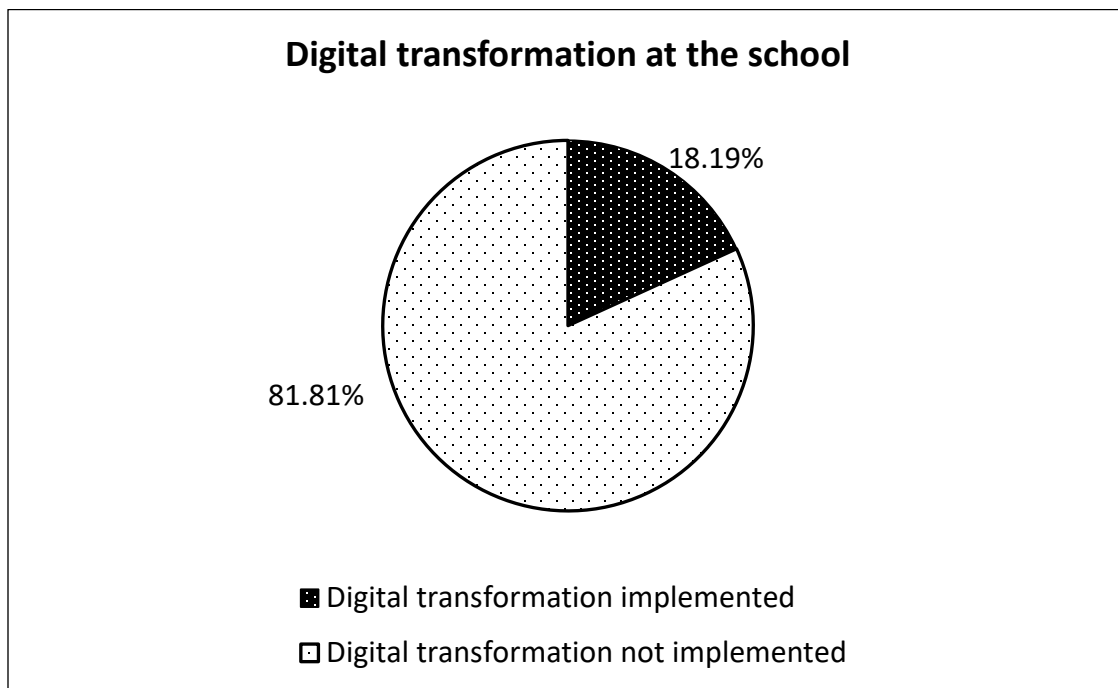


Figure 4.7: Digital transformation status at the school

All the learners recommended that digital transformation be fully implemented, even in rural areas, and agreed that it would substantially improve the pass rate in rural schools.

The learners, however, highlighted that implementing digital transformation in rural areas would not deter their desire to study in towns and cities. Furthermore, all the learners agreed that if their parents had stable finances, they would recommend that parents contribute towards the school's implementation of digital transformation. In addition, learners recommended that social grants be used to assist schools in the implementation of digital transformation.

4.10 Summary

This chapter presented the results from this study and further discussed in detail the research findings based on the questions from the questionnaires in line with the research objectives. Digital transformation programs have not been well implemented in the Khayelitsha settlement, as most teachers and learners provided evidence of how they struggle with their implementation. The biggest challenge highlighted by most respondents was the unavailability of ICT tools and services, which therefore derails the implementation of digital transformation programs. The next chapter concludes this study and gives recommendations to teachers, learners, the community, and the government of South Africa.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The educational system in the world is going through a rapid shift towards digitization (Duma et al., 2021:1). In response to the rapid shift towards digital learning, South Africa came up with policies and programs to support the integration of ICTs in the curriculum of basic education, as it subscribes to various international agencies and treaties. It is important to conduct studies that look into how digital transformations have been implemented in schools, particularly those in marginalised communities, as South Africa has been regarded as having one of the most unequal societies globally. Schools in the poor and marginalised communities continue to be excluded from digital advancements compared to schools in urban areas (Vitus, 2022:3). This study therefore determined the adoption of digital transformation in disadvantaged schools in the Western Cape Province. Such an understanding would provide insight into implementing ICT programs in rural schools. This chapter presents a synthesis of findings, conclusions, and recommendations for policy and research. The approach taken in this chapter is to reflect on the objectives and propositions presented in Chapter 1 to provide a sound conclusion.

5.2 Objective-based Conclusions

5.2.1 Objective 1: Adequacy of the ICT infrastructure that will aid the use of digital transformation tools in the schools

Teachers and learners revealed that the ICT infrastructure at schools in the Khayelitsha settlement is inadequate. Findings from this study therefore do not agree with the first proposition that stated that “the IT infrastructure is adequate to aid the use of digital transformation tools in schools.” This is a matter of concern as the global world is moving towards digitisation, and settlements like these will continue to be marginalised in a developing world, potentially leading to poverty-related issues in the area. Providing ICT education in rural schools is part of the South African government's goals of achieving

equal, basic education for all and continuing to invest in education (Mkhize & Davids, 2021:2; Phahlamohlaka & Lotriet, 2018:31). However, despite such commitments by the South African government, marginalised schools still struggle to provide ICT education as they do not have the equipment and infrastructure to deliver digital transformation programs, as reported in this study.

For decades, South African underprivileged schools have faced issues such as a shortage of classrooms and insufficient access to amenities such as power, water, telephones, and connections, among others (du Plessis & Mestry, 2019:121; Duma et al., 2021:1). These marginalised schools face additional obstacles as a result of technological advancements. In light of the aforementioned constraints, implementing ICT programs in these marginalised schools would be tough. Furthermore, due to their low socio-economic level, community members are unable to support ICT initiatives through their learners. However, providing these technologies and connections to rural learners is a step toward their growth, training, acceptance, and use of ICT, which is the next factor that must be addressed in order for digital transformation to have an influence on these areas (Hage et al., 2013:2).

5.2.2 Objective 2: Effect of digital transformation on the learning experience of learners in the schools

The majority of learners in the Khayelitsha settlement have never experienced digital change and are computer illiterate. As learners had not experienced digital transformation, the statement "Digital transformation has a beneficial influence on the learning experience of student learners in schools" could not be demonstrated. These results support those of Eberhard et al. (2017:47), who found that learners in rural schools are not only technologically illiterate but also functionally illiterate due to weak fundamental reading abilities. Most underprivileged schools lack IT resources and infrastructure. The quality of education is one of South Africa's most visible manifestations of inequality, with educational facilities at urban and private schools vastly different from

those in rural and other disadvantaged schools, mostly attended by black African children and often under-resourced (du Plessis & Mestry, 2019:123). Many rural schools are in disrepair, with broken windows, tables, and desks, as well as poor sanitation (Duma et al., 2021:2). The supply of technical tools to rural schools is an important step, but if the learners have never utilised the Internet or been taught the essential skills to search for, assess, or produce information, technological instruments become an impediment to learning (Duma et al., 2021:2).

5.2.3 Objective 3 and 4: Digital reformation and transformation of teachers' practice in the schools; Teachers' skills level in the schools to use the digital transformation tools to reform the education system in the schools

Most teachers received training from various ICT government programs, mainly for the school management team, and revealed their readiness to use ICT in their schools to improve service delivery and keep up with the technological transformations in the education sector. This is through various training programs and workshops that they have attended. The findings from this study agree with the propositions: *“Digital reformation and transformation positively influence teachers' practice in schools, and teachers have the skills needed to use digital transformation tools to reform the education system.”*

However, some studies have shown that the availability of ICT tools has little effect on how instructors use these resources in the classroom for teaching and learning (Adegbenro, Gumbo, & Olugbara, 2015:1). Furthermore, this investment seems to be a waste since instructors continue to struggle with fundamental ICT skills such as MS Word, MS Excel, e-mailing, and PowerPoint (Adegbenro, Gumbo, & Olakanmi, 2017:80), all of which are crucial in today's world. The responsibilities of teachers are critical to transformational ICT education practices (Simuja, 2018:5). The success of ICT usage in educational contexts is heavily influenced by instructors' attitudes toward technology (Adegbenro, Gumbo, & Olakanmi, 2017:80). This implies that instructors' views regarding computers and other ICT tools are critical to computer acceptability and usage. In

addition, the positive attitude towards ICT itself, as revealed in this study, is a positive step towards digital transformation (Simuja, 2018:5). While the teachers might not have all the necessary ICT knowledge and expertise as the learners, they can emphasize narrative reasoning, which can assist learners in sharing their experiences and revising their respective experiences with the new ICT knowledge. The teacher, therefore, can interpret the experience through the learner's frame rather than having the ICT experience herself or himself (Simuja, 2018:10). Nonetheless, the government should ensure that teachers are adequately trained to use ICT tools by providing exchange programs, especially for teachers in marginalised schools.

5.3 General Conclusions

The state of digital integration in disadvantaged schools in the Western Cape Province was effectively evaluated by this research study. Numerous problems that these schools confront, such as a lack of infrastructure, ICT tools, and resources, have an impact on the integration of ICTs in these schools. These challenges are further coupled with human factors that include the attitude of the teachers, learners and parents. Nonetheless, all the teachers exhibited a basic understanding of digital transformation and technology and how it is crucial in the education sector. Teachers also exhibited readiness to implement digital transformation in Khayelitsha schools which is a positive step towards digital integration in the schools. The only limitations are the unavailability of digital transformation tools, as highlighted in this study all respondents. This study also highlighted the importance of parental support for learners to develop a positive attitude towards ICT integration.

Most learners highlighted that they were not computer literate and did not own smartphones. The few that highlighted that they own smartphones do not even use them for academic purposes. The attitude of learners toward not using smartphones in education derails progress towards ICT integration in the education system. When these learners advance to the next stage of education, they are likely to face challenges as most tertiary institutions have a highly integrated curriculum with digital tools. Therefore,

the successful integration of ICTs in schools depends on a positive relationship between teachers, learners, and parents.

This study is vital to the future success of learners in marginalised South African schools since every person, regardless of demographics, has to grasp the fast growth of digitisation. This applies not just to underprivileged schools in the Western Cape's Metro East District but to all marginalised schools in South Africa. This knowledge must be contextualised within the perspective of South Africa's information literacy reality. As a result, it is critical that all stakeholders address this problem in order to fulfil the national and global objectives of equipping individuals with ICT skills beginning with elementary schooling. This study made suggestions based on the research results, which are addressed in the next section.

5.4 Recommendations

Based on the results of this research, several suggestions for eliminating the digital disparity gap in South African schools situated in rural environments are particularly aimed at the South African government. The South African government should provide long-term assistance for rural schools undergoing digital transformation. The South African government should launch skill development programs for marginalised school teachers to guarantee that they obtain the necessary abilities to more effectively use contemporary ICT. ICT-enhanced teacher education programs should be implemented in teacher training institutions and universities so that all teachers are equipped and comfortable with the latest ICT tools when they begin their teaching careers, improving their digital literacy and raising awareness of digital developments. South Africa's government should invest in the infrastructure required to foster digital transformation and improve internet access in rural regions. Parents may help the digital transformation by prioritising the use of smartphones and laptops purchased for their children for ICT educational activities.

A limitation of this study is that a small sample of schools was used, and therefore, the findings of the study cannot be generalised to other rural schools both within and outside

the Metro East District of the Western Cape. Future research can sample more marginalised schools, which should be compared with schools in urban areas in order to clearly bring up the digital divide concept. The sample sizes of the educators and learners could also be increased so that they represent learners and educators in South Africa to generalise the results. This is meant to highlight the social inequalities in South Africa so that studies can be used to change the status quo.

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Appendices

Appendix A: Ethics Informed Consent Form



Faculty of Business and Management Sciences
Ethics Informed Consent Form

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Category of Participants (tick as appropriate):

<i>Staff/Workers</i>	<input type="checkbox"/>	<i>Teachers</i>	<input type="checkbox"/>	<i>Parents</i>	<input type="checkbox"/>	<i>Lecturers</i>	<input type="checkbox"/>	<i>learners</i>	<input type="checkbox"/>
<i>Other (specify)</i>	<input type="checkbox"/>								

You are kindly invited to participate in a research study being conducted by **Simbulele Cwala** from the Cape Peninsula University of Technology. The findings of this study will contribute towards (tick as appropriate):

<i>An undergraduate project</i>	<input type="checkbox"/>	<i>A conference paper</i>	<input type="checkbox"/>
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<i>An Honours project</i>		<i>A published journal article</i>	
<i>A Masters/doctoral thesis</i>	<i>x</i>	<i>A published report</i>	

Selection criteria

You were selected as a possible participant in this study because:

(a) You are a teacher and teaches in the Metro East District of the Western Cape Education Department

(b) You are a learner of a high school in the Metro East District of the Western Cape Education and

(c) You are Principal at a high school in the Metro East District of the Western Cape Education

The information below gives details about the study to help you decide whether you would want to participate.

Title of the research:

Digital Transformation in Basic Education Sector: A case study of selected disadvantaged schools in the Western Cape.

A brief explanation of what the research involves:

The study is to explore the Digital Transformation in Basic Education Sector, the capabilities of digital (disruptive) technologies including, the Internet of things, devices such as iPad, laptops, mobile phones, video, and audio to develop and propose high-

leverage intervention (new strategies and techniques and wealth creation solutions) to effectively grow and sustain township schools.

Procedures (*Interview and Self-administer questionnaire*)

If you volunteer to participate in this study the following will be done:

1. Describe the main research procedures to you in advance, so that you are informed about what to expect.
2. Treat all interviewees with respect by arriving on time for all the interview schedules and well prepared.
3. Conduct an introduction with the interviewee in order to break ice.
4. All the interviewees will be asked for permission to record the interviews and also take some note where applicable.
5. In a case where there is no clarity, the interviewees will be allowed to ask for confirmation or clarity of words/sentences/phrases to ensure accuracy of the data collected.
6. Participants will be told that their data will be treated with complete confidentiality and that, if published, it will not be identifiable as theirs.
7. Participants will be given the option of omitting questions they do not want to answer or feel uncomfortable with.
8. Participants will be told that questions do not pose any realistic risk of distress or discomfort, either physically or psychologically, to them.
9. At the end of each interview all the interviewees will be thanked for their time and information provided for this study.
10. Participants will be debriefed at the end of their participation (i.e. give them a brief explanation of the study).

You are invited to contact the researchers should you have any questions about the research before or during the study. You will be free to withdraw your participation at any time without having to give a reason.

Kindly complete the table below before participating in the research.

Tick the appropriate column		
Statement	Yes	No
I understand the purpose of the research.		
I understand what the research requires of me.		
I volunteer to take part in the research.		
I know that I can withdraw at any time.		
I understand that there will not be any form of discrimination against me as a result of my participation or non-participation.		
Comment:		

Please sign the consent form. You will be given a copy of this form on request.

Signature of participant	Date

Researcher

	Name:	Surname:	Contact details:
1	Simbulele Carol	Cwala	079 860 3411
2.	Michael	Twum-Darko (Dr)	078 457 7206

Contact person: Ms Simbulele C Cwala	
Contact number: 079 860 3411	E-mail:

Appendix B: Interview Schedule Questions (Educators)

INTERVIEW SCHEDULE QUESTIONS (Educators)

Instructions

- Give your responses in the given spaces

Section A: Demographic details (Tick the appropriate box)

1. Age _____
2. Gender _____
3. Occupation _____
4. Years of experience _____

Section B: Adequacy of IT infrastructure to aid the use of digital transformation in the schools

- 1.) In your own words, what is your understanding of digital transformation?

- 2.) What would you suggest are the benefits of digital transformation of teaching and learning?

- 3.) What is your understanding of digital platform in relations to digital transformation?

- 4.) Please explain your understanding between digital transformation and digital platform?

Section C: digital reformation and transformation on teachers' practices in the schools

- 1.) What do you require as a teacher to adopt a digital platform in teaching and learning?

- 2.) How do you find the transition from the old ways of teaching to the new way of using digital platform?

Section D: Level of digital skills needed by teachers in the schools for digital transformation

- 1.) As a teacher, what skills do you have that is helping you to adopt the use of digital platform in teaching and learning? Please explain.

- 2.) As a teacher, what additional skills would you recommend or need for effective and efficient teaching and learning using digital platforms

Appendix C: Interview Questions (Learners)

Instructions

This form to be administered by the researcher.

Researcher should read all questions and responses.

- Researcher should tick the appropriate response in Section A and B and fill in the given responses in given spaces in Section C.

Section A: Demographic details (Tick the appropriate box)

Gender

Male	Female	Other

Section B: Socioeconomic status of learners (Tick the appropriate box)

	Yes	No
Are you on social grant?		
If yes, is it helping you to live a better life?		
Should social grants be used to assist schools in the implementation of digital transformation?		
Do your parents have an RDP house?		
If not, do your parents wish to have an RDP house?		
Are your parents employed?		
If not, are they looking for the job?		
If your parents have money, would you recommend that they contribute towards the school implementation of the digital platform?		
Is the digital platform beneficial for your community?		
If your school has already implemented the digital transformation? If yes is working effectively		
Would you recommend the digital transformation that must be fully implemented even in rural areas?		
Do you think the implementation of digital transformation will improve the school passing rate?		
Do you think the implementation of digital transformation in township schools will prevent learners from going and study in town or city?		

Section C: Effectiveness of digital transformation on learning experience of learners in the schools

- 1.) As a learner, can you please describe your experience using a digital platform to learn?

- 2.) Explain how successful the application of digitalisation has been for your learning experience.

- 3.) Explain how the digital platforms in teaching and learning have contributed to learners' development.