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EVALUATION OF FACTORS THAT HINDER THE IMPLEMENTATION AND EFFECTIVENESS OF E-EDUCATION IN MPUMALANGA

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DECLARATION

I, **Anita Mnisi**, hereby declare that the dissertation on Master of Management in Public Policy that I submitted to the University of the Witwatersrand is my personal effort and that it was not submitted for any other degree in another university or institution of higher learning, and that it has not been copied, as all materials used are adequately cited and referenced.

PUBLICATIONS

Journal publication

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ABSTRACT

In South Africa, the concept of e-Education revolves around the use of information and communication technologies (ICTs) to accelerate the achievement of national education goals. The concept of e-Education is about connecting learners and teachers, as well as providing professional support services and learning platforms. It will connect learners and teachers to better information, ideas, and one another in support of educational reform by combining effective pedagogy and technology. It advocates for broader systemic, pedagogical, curricular, and assessment reforms to improve education and the use of educational resources like ICT, which aligns it to the communications definition, which defines e-Learning as "learning administered through the use of electronic devices and materials that includes collaboration, such as online interactions between the teacher and the learners or amongst learners. Incorporating technology into learning and teaching activities requires the use of information and communication technologies. Which allows for learning to take place either remotely or online with the assistance of technological tools. ICTs include, but are not limited to, hardware and computer programs (software) for storing, accessing, organising, and retrieving information, computers, scanners, digital cameras and database programmes according to the e-Education policy.

The goal of the e-Education policy was to increase access to high-quality education in order to advance society and the economy, while also addressing issues caused by the ICT revolution in education, which has an impact on curriculum development issues such as participation in the information society. It affects the integration of ICT into learning and teaching, as well as access, costs, and educational quality. It is just as important to ensure that learners can use ICTs creatively and actively participate in the information society as it is to bridge the digital divide by looking beyond connectivity and infrastructure. The difficulties in implementing e-Learning in South Africa and Africa are attributed to a lack of appropriate infrastructure, stable connectivity, and skills, which led to the closure of schools during the COVID-19 pandemic. In other nations, e-Learning succeeded as a substitute for conventional instruction, particularly during the COVID-19 pandemic, when education was carried out through online platforms. Governments

across the world have put policy plans in place with regards to the implementation of e-Learning and plans on how to successfully achieve the goals set out in the policies.

The purpose of this study was to identify barriers to effective e-Education implementation at the district level. The study investigated the difficulties associated with integrating ICTs into teaching and learning activities at the district level, including whether there is access to technological devices, connectivity, infrastructure, skills, and the necessary district support to implement the e-Education Policy. The study also assessed why teachers do not use ICTs in the classroom despite the fact that the Professional Development Framework for Digital Learning and Guidelines for Teacher Training and Professional Development are in place to equip them and provide guidelines for their development, particularly in terms of ICT integration. Mixed methods were used to collect and analyse data in order to gain a better understanding of why ICTs have not been fully integrated, with the goal of gaining more knowledge and sharing that knowledge in order to improve understanding of the challenges associated with ICT integration in rural schools.

The findings of the study confirmed that the lack of access to ICT tools, internet connectivity, skills and ICT infrastructure hinders the implementation of the e-Education policy. Provision of ICT systems and capable teachers enhances the integration of ICT systems into teaching and learning. As the results show that teachers are willing to use ICTs even though they generally prefer traditional methods, they would use ICTs together with traditional methods if they were available. This would ultimately result in a blended learning approach which is good for transitioning into e-Learning from the classroom. The findings confirmed that teachers require training in order to integrate ICTs into teaching and learning activities, and they also highlight the government support that is required to achieve this. This would allow the Department of Basic Education (DBE) to meet its goal of having ICT-capable learners who can use technology for personal development and eventually become participants in the information society, and thus use e-government systems. It would also enable the DBE to close the digital divide.

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ACRONYMS AND ABBREVIATIONS

Abbr.	Meaning	Abbr.	Meaning
NQF	National Qualification Authority	NEP	National Education Policy
OBE	Outcome-Based Education	4IR	Fourth Industrial Revolution
ICT	Information and Communication Technology		
NCS	National Curriculum Statements		
DOE	Department of Education		
NIED	National Institute for Educational Development		
GOR	Government of Rwanda		
ESSP	Education Sector Strategy Plan		
NICIP	National Information and Communication Infrastructure		
ICT4D	Information and Communication Technology for Development		
PC	Personal computer		
DBE	Department of Basic Education		
ISPFTED	Integrated Strategy Planning Framework for Teacher Education and Development		
PLCs	Professional Learning Communities		
SGB	School Governing Body		
SAIDE	The South African Institute for Distance Learning		
IT	Information Technology		
CAT	Computer Applications Technology		
TPD	Teacher Professional Development		
GDE	Gauteng Department of Education		
ADDIE	Analysis, Design, Development, Implementation, and Evaluation		
M & E	Monitoring and Evaluation		
MINEDUC	Peruvian Ministry of Education		
NGO	Non-governmental Organization		
UNESCO	United Nations Educational, Scientific and Cultural Organization		

CHAPTER ONE

INTRODUCTION

1 Background information

South Africa's basic education system remains in shambles, despite government efforts to bring about transformation and address the three concerns of unemployment, inequality, and poverty. Basic education remains in crisis (Masondo, 2016) especially in rural areas where poverty persists. Despite measures in the past two decades to improve the basic education sector, poor and unequal performance persists especially between rural and urban schools. One of the significant changes noted is the inception of two important strategies, the National Qualifications Framework (NQF) and the Outcome-Based Education (OBE). The NQF was crucial in creating an enabling environment to redress past discriminations in education through greater access and equality in the basic education sector. The Republic of South Africa's 1996 Constitution, as amended, and in particular section 29 (2a and 2c), which outlines the requirement to assess the impact of previous racially discriminatory legislation and application, provide the legal framework for redress (Mubanga, 2012).

While OBE was designed to make learning a more intelligent and interactive process between learners and teachers, it represented a significant shift in educational policies because the reform did not just focus on curriculum revamping but completely shifted away from the Content Based Education that was used during apartheid (Mubanga, 2012). The African National Congress pushed for the changes in its *White Paper on Education*, which was published in 1995 (DoE,1995). The National Educational Policy (NEP), the Language in Education Policy, and South Africa's Schools Act 84 of 1996 were all introduced, ushering in a new era (Scouter,2011).

The National Curriculum Statements (NCS) for grades R to 12 were created in 2002 because of this. The NCS sets out a policy on curriculum and assessments in the schooling sector (DBE, 2004). The NCS aims to ensure that learners acquire information and skills and also use them in ways that improve their lives. In addition to responding to

developments on a global scale, knowledge should be promoted in local contexts. The NCS was founded on the principle of social transformation, with the aim of ensuring that past educational disparities are addressed and provide equal educational opportunities for all (Mubanga, 2012). Learning and teaching activities under these reforms required physical contact, hence activities occurring in a classroom environment.

When the COVID-19 pandemic broke out in 2020 it necessitated a shift away from the classroom due to the measures required to halt its spread. South Africa reported its first case in March 2020, soon thereafter, the number of cases increased to 1 585 in less than a month and towards the end of April the numbers had increased to 3 953 with 75 COVID-19 related deaths (Stiegler & Bouchard, 2020). In order to avert the increase of COVID-19 and reduce the number of cases, the government declared a national lockdown. This meant school closures, thus presenting a major challenge in the education sector in ensuring that learning activities continue (Mahaye, 2020). Other governments across the world also implemented lockdowns especially after the World Health Organization proclaimed COVID-19 an epidemic, and they also faced similar challenges in ensuring that learning and teaching activities continue during this period.

The pandemic occurred during an era of global technological advancements which has seen the introduction of artificial intelligence, robotics and the internet of things. This era is also known as Fourth Industrial Revolution (4IR), that is defined by the use of technology, which clearly distinguishes the physical, digital and biological spaces. This indicates a greater need to be innovative and create new ways for engagement in different sectors. Citizens require different digital skills in order to contribute to the modern society, such as, digital literacy and digital leadership to have space in the technological society of the 21st century (Twinomurinzi, Mawela, Msweli, & Phukubje, 2021). However, for any country to realise this, the government needs to expose its citizens to technology and develop the capabilities required to utilise such technologies. Such as, building citizens skills and capabilities that are essential for using ICTs (Mwapwele, Marais, Dlamini, & Van Biljon, 2019). As ICTs have the potential to reduce the digital divide; they can also contribute to the attainment of national goals in education by providing a guide on the incorporation and utilization of technology.

The pandemic has changed the basic education sector indefinitely and subsequently the need to accelerate the proper implementation of e-Learning has increased. More than 1.2 billion children throughout the planet were affected by school discontinuation due to the COVID-19 pandemic (Tria, 2020). This brought an unexpected shift away from the conventional classroom to online instruction across the world (Mhlanga & Moloi, 2020). The shift has brought up questions about the fate of basic education post-pandemic, and whether the practice of e-Learning will keep on rising and what this would mean for the basic education sector. With the growing utilisation of ICTs in schools and the 4IR, governments are being compelled to lay the groundwork for such a foundation that will enable ICTs to be utilised in teaching and learning activities. Thus, the DOE developed the *White Paper on e-Education in 2004* to restructure the education sector as a result of such improvements in ICT which have altered educational processes. Enabling access to more extensive educational resources outside of traditional channels.

The government created the Professional Development Framework for Digital Learning to guarantee that teachers are well-equipped to use ICT in the classroom to transform educational activities. The framework was to also to ensure capable leaders who support their staff and encourage the development of educators' digital competencies. In order to execute the White Paper, they also created a criteria for teacher training and professional development in 2007. ICTs are crucial for putting the White Paper into practice because they provide more options for learning access, address disparities, and enhance the caliber of instruction. The South African government embarked on supporting ICT implementing in schools through the arrangement of portable devices such as tablets in primary schools for learning purposes (Isaacs, 2007).

However, this calls for a more equal distribution of opportunities and resources that are required for e-Learning. E-learning can provide better approaches for communication between learners and the teachers regarding data choices, collection, sorting out and dissecting that data. This can prompt better administration of managerial frameworks in schools, thus strengthening management capacity. E-education aims to revolutionize the methods of instruction in basic education by using ICTs to respond to the advancements in education. This has been set out in the *White Paper on e-Education of 2004* (DBE,

2004). The DBE's e-Education strategy could provide all schools with a wide range of diverse and excellent communication facilities. However, this is not without difficulties as the provision of modern technologies to schools is an overwhelming task that requires huge investments in skills, resources and ICT infrastructure. Despite the framework for cooperation and coordination in the development of ICT infrastructure within the education system, significant challenges remain, particularly in rural areas.

They include deficiency of ICT infrastructure, facilities, resources and network connectivity and lack of skills to administer e-Learning which calls for teacher professional development initiatives to provide them with the required expertise and ongoing support as technologies change (Mutude, 2017). Equal access to ICT infrastructure between rural and urban schools would create equal opportunities to partake in the technological society and also enable the government to bridge the digital divide (Rena, 2008). E-education in South Africa is centred on policy intents and proposal for ICTs to be used as instruments to support the idea of addressing the gaps caused by apartheid which have resulted in rural-urban digital divide, especially in education. However, there is scant documentation from Africa and South Africa, on utilising ICT in remote schools for teaching and learning activities and rural teacher development for ICT use. Some of the limited research focused on how teachers in rural public schools utilise ICTs in the classroom, the technology preparedness and the repercussions thereof (Greunen, Veidsman & Botha, 2021). Therefore, the goal of this study was to evaluate the challenges of e-Learning and e-Education policy implementation at district level. It is based on a case study of five schools from the Manyeleti Education Circuit in Hluvukani village, Mpumalanga, South Africa.

1.2 Problem statement

The overall purpose of the e-Education policy is to guarantee that all learners in the basic education sector can confidently use ICT to develop their abilities, accomplish personal objectives, and take part in the information society. As much as it was about transforming the education space and integrating ICTs into the curriculum, the policy did not envisage the outbreak of the COVID-19 pandemic or any other pandemic that would warrant social

distancing and ultimately complete remote learning. As such, the government was caught off-guard despite the presence of such a strategic document.

The failure to properly implement the e-Education policy became evident with the outbreak of the COVID-19 pandemic in 2020 as countries implemented hard lockdowns to prevent its spread. This made it evident that the policy had not been properly implemented in rural schools, with challenges such as the lack of proper infrastructure, skills, technology required for e-Learning and its integration into the pedagogy becoming apparent in rural schools. This resulted in the exclusion of rural learners from participating in the information society as a result of ICT initiatives not reaching every school and every district (Van Wyk, 2012).

Although there are provisions to ensure that implementation was made through the Professional Development Framework for Digital Learning and Guidelines for teacher training and Professional Development. Which were supposed to equip teachers with the guidelines and necessary skills to implement the policy. However, knowledge, skills and values associated with implementing the policy are still lacking among rural teachers. Support to integrate ICTs into learning and teaching is also lacking from both the DBE and district officials who might not be fully equipped to implement the policy. In light of this situation, there is a need to devise prudent and pragmatic ways to implement e-learning and the e-Education policy, but this must be accompanied by a strong recognition of the obstacles that may impede the process.

1.2 Hypothesis

H1: Lack of ICT systems and capable teachers hinders the integration of ICT systems into teaching and learning.

1.3 The aim and objectives of the study

1.3.1 Aim

The overall aim of this study is to identify and evaluate factors that hinders the implementation and effectiveness of the e-Education and infer recommendations as to

how e-Education can be successfully integrated into learning and teaching activities in Manyeleti Education Circuit, Hluvukani region, Mpumalanga, South Africa.

1.3.2 Objectives of the study

The following specific objectives were duly pursued in the quest to achieve the overall aim of this study:

- To determine the challenges that hinder the integration of ICT system into teaching and learning within schools in the Manyeleti Education Circuit, Hluvukani region, Mpumalanga, South Africa.
- To investigate the extent to which the availability of ICT systems could have facilitated alternate learning approaches during COVID-19 and beyond.
- To assess the extent to which teachers are equipped to successfully incorporate ICT systems into teaching and learning.
- To highlight the needs and the required support for e-Learning to be effectively implemented and rolled out.
- To develop viable modalities, recommendations, and suggestions on how e-Learning could effectively be implemented.

1.4 Significance of the study

The e-Education policy sought to incorporate ICT into classroom learning and teaching activities; however, there have been challenges in implementing it and this has resulted in schools closing during the first hard lockdown in South Africa in March 2020 due to COVID-19 (Mahaye, 2020). As a result, schools were compelled to change from traditional methods to online methods as a replacement option for learning and teaching. However, this was not the case for rural schools as they were not familiar with any form of alternative learning despite the usual physical classes.

The DBE has long supported online learning and technology usage in the classroom by attempting to bring innovation in teaching methods and also promoting interactive

learning and teaching (DBE, 2004). However, there have been challenges with implementation especially in the rural areas. As a result, it was difficult to deliver a quick shift to online instruction and learning through the pandemic as a result of insufficient internet connectivity, skills and the required ICT resources for online learning.

This research will highlight the need to accelerate the implementation of online learning in rural schools and expose the incompetence of the Department of Basic Education to mediate and respond quickly to the disturbances brought by the pandemic to learning and teaching. If the policy had been followed through with proper and effective implementation, learning activities in the rural areas would not have been discontinued at the beginning of the hard lockdown in South Africa, as there would have been measures in place to counter the challenges. Henceforth, there is a need to devise prudent and pragmatic methods for e-Learning or e-Education to be implemented due to the possibility and anticipation that the world might experience other pandemics or any other forms of disturbances to the education sector.

1.5 Limitations of the research

The researcher experienced difficulties such as hesitant individuals who refused to participate for various reasons such as not obtaining laptop computers from the government. They were unwilling to complete the questionnaire, while others were unwilling to complete the online survey due to data difficulties. As a result, hard copy questionnaires were created to assist individuals who were unable to complete the online survey. Some participants returned the surveys incomplete, citing a lack of time because the schools had recently resumed.

1.6 Structure of the dissertation

This document comprise five chapters that have been unpacked as follows:

Chapter 1: This chapter gives a thorough background on the substance of the research as well as the obstacles that the area under investigation has when it comes to integrating ICT systems into learning and teaching activities. The goal is to respond to the obstacles

encountered in the regions under investigation, as well as the importance of the proposed study.

Chapter 2: The review of literature is the subject of this chapter. This will examine the obstacles and advances in ICT system integration throughout the world. As a result, it will also provide policy views and theoretical frameworks for addressing the difficulties.

Chapter 3: This chapter provides details on the procedures and instruments utilized to accomplish the study's objectives. It specifically explains the analytical techniques, tools, and quality control processes that were used and followed during data collection and analysis.

Chapter 4: This chapter will provide a full overview of the findings and arguments derived from the presented methodology and data. It attempts to cover the specified aims of this study in relation to the findings to a larger extent. Quality control techniques and further findings are also presented.

Chapter 5: Finally, this chapter will summarize the study's significant findings in connection to the described objectives. Following that, the detected gaps will be listed as recommendations for future study avenues. This will then be used to direct future research in areas revealed by the study's findings.

CHAPTER TWO

LITERATURE REVIEW

2 Introduction

This chapter provides an extensive literature analysis that thoroughly unpacks the definition of e-Learning, its advantages, its problems, teachers' attitudes toward e-Learning integration, the lack of skills, the policy environment and implementation concerns, theoretical framework, and, finally, the conceptual framework.

2.1 Defining e-Learning

There are several description of eLearning; however, there is no consensus on a specific definition. The definitions are solely based on different fields such as communications, education, and technology. The "communications" definition, unlike the technological ones, focuses on communications in e-Learning as an interactive and collaborative tool. It defines e-Learning "as learning administered through the utilisation of digital tools and content that involves some form of interactivity, which may include online interactions between the teacher and the learners or amongst learners" (Sangrà, Vlachopoulos, & Cabrera, 2012, p149).

The "educational" category, in contrast, defines e-Learning "as a new way of learning or as an improvement to current educational paradigms that are already in place. It also defines e-Learning as the use of multimedia technologies and the Internet to enhance the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration" (Alonso, López, Manrique, & Viñes, 2005, p217-235). This definition corresponds to that which defines "e-Learning as information and communication technologies that are utilised to support learners in refining their learning abilities" (Alonso et al, 2005).

E-learning in South Africa is consistent with the communications definition as it focuses on the usage of Information and Communications Technology to advance the attainment of the educational objectives of the country. E-education is concerned with connectivity

to the Internet, information, teachers, and other learners using technology (DoE, 2003). Meier (2007) views “terms such as ‘e-learning’, ‘online learning’, ‘virtual learning’, ‘web-based learning’, ‘internet-based learning’ and ‘resource-based learning’, all refer to the use of Internet technologies to provide education” (p. 661). The policy's goal is for all learners in primary and secondary schools to be prepared to use ICT by 2013. However, this goal has not been achieved as we have learners especially in the most rural parts of the country who are not yet capable of using ICTs.

2.2 Benefits of e-Learning

The adoption of e-Learning in educational institutions can have a variety of advantages. ICTs are thought to be able to improve school administration systems, expand access to education, and alter educational practices (Owino, 2013). Furthermore, they can transform classrooms into paperless spaces by using technology and online content. Demonstrating the effectiveness of ICTs as tools for transforming the classroom into a more dynamic and knowledge-based setting (Sitienei, 2015). It can also ensure that the government delivers educational resources quickly and effectively to prevent cases like the 2012 Limpopo textbook calamity. With the implementation of a new curriculum for grades 1, 2, 3, and 10, the government failed to provide textbooks for those learners at the beginning of the year.

The Advantages of e-Learning include the ability to deliver distance learning, which allows for flexible learning times. This is possible where portable gadgets like iPads, tablets, and laptops are available alongside internet connection (Masonta, Ramoroka, & Lysko, 2015). Online learning provides people all over the world with access to relevant data they require, allowing information to be widely disseminated (Kamsin & Is, 2005). Meaning it can be beneficial for learners who use it and allow them a wider reach of resources, however, it required supervision as learners will be exposed to phishing and cyberbullying. Moreover, e-Learning can be blended with physical interactions supported by use of technology in the classroom (Smythe, 2012). The developments in ICTs have great potential for education especially in this era where the internet is mostly used to communicate, publish, and share content (Alajmi, 2010).

A platform for high-quality instruction and convenient access to reference resources, including rich multimedia data, can be created by e-Learning. It can also capacitate learners to speak with other learners who are experiencing the same issues and look for answers outside of the classroom, it can also assist teachers to share lessons and look for collective solutions to challenges associated with ICT integration (Kamsin & Is, 2005). It may provide teachers and administrators with simpler means to look for opportunities for their learners, such as scholarships, and outcomes on the results to the department and parents. Additionally, it can provide governments with quick and convenient ways to gather information and progress reports from the schools, allowing them to respond immediately when it matters. While there are numerous benefits to using e-Learning in educational activities, such as improving educational quality there are still many barriers that prevent full discovery and use of its capabilities, such as connectivity, computer access, and online material availability (Alkharang & Ghinea, 2013).

2.3 Policies for e-Learning (comparative perspectives)

One of the first African nations to develop an ICT in Education strategy was Namibia. The National ICT Policy for Education was created by the Ministry of Basic Education's National Institute for Educational Development (NIED) in the late 1990s, which marked the beginning of the policy-making process. By 2005, this policy had undergone a revision and had been formally adopted. This policy is intended to assist all Namibian educational leaders in preparing for the challenges that may be brought by a globalised economy and in the 21st century to Namibian society.

The goal of the policy is to create ICT-literate Namibians who are able to participate in the emerging economies brought about by ICT and related advancements. It also plans to guide the use of ICT in education by enhancing administrative and management effectiveness and attain high-quality educational services for all. This aligns with the goals outlined in South Africa's *White Paper on Education*, which include bringing together learners amongst themselves, connecting teachers to professional guidance, and providing learning platforms (DBE, 2004). Some of the advantages of investing in ICT incorporation in educational activities is that ICTs directly contribute to education as a

subject and indirectly as a tool to support educational delivery and management. This suggests that the Policy prioritises the incorporation of ICT into curriculum and its implementation (Isaacs, 2007).

Singapore's ICT Master Plans for Education were successful thanks to strong political commitment. The Minister of Education launched each of the three ICT Master Plans for education in 1997, 2002, and 2008, respectively. It's crucial to take into consideration that the political force was accompanied by a focus on educating the population to help the nation remain economically competitive in a time when innovation is the driving force behind the economy (Enrique & Hinostroza, 2018). ICT in the classroom Master Plans serve as guidelines and technology integration frameworks for the classroom. Although new technologies may be developed during that time, each Master Plan has a purpose of serving as a guide for a five-year period. However, the plans depend on more than just technology; they also take into account broad strategic pedagogical goals for educators and teachers who use technology in education (Wong & Divaharan, 2013). In contrast to the above, Uruguay is putting into practice a bold plan for extensive ICT appropriation in the community and educational system. As a result, the Uruguayan president introduced the Plan Ceibal in 2006 with the intention of giving every primary school pupil and teacher access to a portable computer (Vázquez, 2006).

The implementation of the plan started in 2007 with a test programme in one school, it was extended to the whole country in 2008 and was finally completed in 2009 in Montevideo as the covered capital. All primary learners and teachers in public schools were obligated to have access to an educational portal with resources and neighbourhoods were required to assist and enhance teaching and learning activities, by installing free wireless internet in public places. After achieving these objectives, the government plans to carry on by providing secondary school teachers and learners with portable computers (Ceibal, 2009a). Spark schools in South Africa are an example of an independent school that has developed an online learning portal; they also offer a guide on how to make remote learning work for younger children.

The main objective is not only to provide schools with access to equipment and ensure that they have it; rather, it is to ensure that it is used creatively and integrated into regular classroom activities (Enrique & Hinostroza, 2018). Ceibal's implementation strategy is backed up by strong strategic and political leadership provided by the Political Commission, decisions depend on agreement, engagement and organisational behaviour that emphasises technological components such as computers, connectivity and services. Despite this, Ceibal still has a lot of obstacles to overcome in areas like sustainability, content and Internet provision, and technical and pedagogical support, to name a few. Additionally, even though more people having access to laptops should make it simpler to incorporate ICT into educational activities, Ceibal's main challenge appears to be proper ICT use in the classroom, which is typical of these policies.

According to its overarching Vision 2020 policy, the Government of Rwanda (GoR) has implemented a number of related policies to turn the nation into a knowledge-based economy (Uwizeyimana, 2019). Vision 2020 places a strong emphasis on the role of information and communication technologies (ICTs) in transforming Rwanda's educational system and advancing the nation's socioeconomic development. The GoR endorsed the National Information and Communication Infrastructure Plan (NICIP), it is a broad policy framework on ICT development for Rwanda together with the Education Sector Strategic Plan (ESSP), the country's broad education policy framework is heavily influenced by the Education for All initiative, in conjunction with Vision 2020 (Trucano, Farrell, & Isaacs, 2007).

The major reason for the low levels of ICT penetration in most countries is the expensive setup and maintenance of network infrastructure. The lack of an adequate electricity infrastructure exacerbates the high cost of accessibility, particularly for internet and mobile services (Balanskat, 2007). According to the UNESCO’s (2011) analysis of ICT policies in 30 European nations, 15 of the 30 had both a general education policy that included ICT and a specific ICT policy; six had a general education policy but did not include ICT; and six had a general education policy but did not include ICT (Kozma & Isaacs, 2011).

2.4 Policy implementation challenges in South Africa

According to the World Bank (2017), policy fails in South Africa because it is not normally based on empirical substantiation, the e-tolls, for example, was met with opposition upon their introduction in 2013, with people claiming they were not consulted. Regarding the incorporation of ICTs into educational activities, Mwapwele, Marais, Dlamini, & Van Biljon, (2019) found that many ICT interventions fail because their target populations struggle to keep up with the new online learning tools. The mismatch between ICTs and user requirements is cited as a major factor in such failures (Alsabawy, Cater-Steel & Soar, 2011; Avgerou, 2008). Clashes between National and school policies have also been identified as one of the hindrances in the enactment of the e-Education policy, specifically, school policies prohibiting the use of mobile phones on school grounds. This policy conflicts the objective of South Africa connect policy (Mwapwele et al., 2019).

Government initiatives must be properly monitored in order to be carried out successfully. The establishment of systems and tools for monitoring implementation procedures and results is required for the incorporation of technology into the school system. Developing strategies and metrics to monitor how ICT investments and policies impact teaching practices as well as learners' abilities and knowledge is essential. As a result the modern educational management information systems should be upgraded with particular information and measurement tools (EMIS) (Kozma & Vota, 2014).

The lack of policy influence is due to a variety of factors. Government policies occasionally amount to little or nothing due to the actions that are meant to appease donors, special interest groups, or political backers without offering the programs or resources necessary to implement policy or bring about change (Elmore, 2004). Elmore refers to these symbolic rules as "parallel play," to which educators and administrators react by implementing administrative changes that have nothing to do with teaching and learning but instead make use of computers to generate reports and enrolment statistics.

This strategy is effective as long as rules are vague enough to prevent the classroom from having any clear mandates and as long as any results that are expressed are not evaluated or quantified. Under these conditions, all stakeholders in the parallel play are

satisfied, but nothing changes. Teachers might vehemently disagree with policy changes they feel are being imposed upon them exclusive of their input or consent, or they could combine both old and new techniques by selecting policy components that will improve their job satisfaction or productivity without fundamentally altering how they teach (Tyack and Cuban, 1995). Policies may also be ineffective in the classroom if they don't explicitly link to instructional practice, afford teachers the chance to learn about the policies and how they might affect instruction, and do not have enough programmes and resources to support their objectives (Cohen and Hill, 2001).

2.5 Challenges associated with the implementation of e-Learning

2.5.1 Policy challenges of implementing e-Learning

Despite having strong policies, South Africa has difficulty putting them into practice because of poor planning, a lack of political will, administrative issues, and a failure to involve potential beneficiaries in the policymaking process (Ajulor, 2018). The e-Education Policy is no exception, it was created and given to teachers to implement. However, despite having a framework and guidelines to help with the policy's implementation, the problems mentioned in these documents have not been addressed to guarantee the policy's implementation. Additionally, it was unclear if the policy simply intended to incorporate ICTs into learning and teaching, or if it also sought to replace the conventional methods (DoE, 2004).

The e-Education strategy is another example of a policy based on what has worked in other countries, typically more developed nations than South Africa, and is not evidence-based. It is necessary to implement evidence-based policies that are informed by South African narratives and the need for social cohesion (Walls, Santer, Wills, & Vass, 2015). The misconception in this situation is that giving teachers access to computers and providing them with basic ICT training will enable them to incorporate technology into their pedagogy. This demonstrates that the majority of ICT initiatives are not supported by research, which accounts for the lack of theoretical justification or a methodical approach to implementing ICT in schools.

Noor-Ul-Amin (2013) supports this viewpoint by describing how ICT, in particular computers and internet technology, open up new educational activities' opportunities. However, they emphasised that their implementation is incredibly challenging because the effort to integrate technology into learning has forced teachers to rethink their teaching methods beyond conventional ones and has received insufficient support at both regional and national spectrum. The transition requires teachers to be comfortable with ICTs otherwise they continue with conventional methods. The majority of research studies concentrate on training initiatives, technology testing, models or techniques, and testing e-Learning issues, drawbacks and challenges, underutilisation, and non-adoption of accessible technology, especially computers. It is significant to have a sufficient understanding of the implementation issues and how districts might be encouraged to effectively implement the e-Education policy.

2.5.2 Lack of skills

Both teachers and learners lack the skills necessary for using ICTs in the classroom or for online learning. As a result, educators continue to use traditional techniques and exclusively prepare lessons using computers. The biggest barrier to e-Learning implementation, according to a study by Saputra, Hikmah, Saputra, Wahab, and Junedi (2001), was at the student level. Most participants believed that learners lacked the skills and knowledge required to use e-Learning apps.

The ease with which the teacher uses ICT in the classroom determines the learners' ability to access and understand ICT information. The majority of participants also concurred that their learners were unable to access learning materials as they did not have devices and were not connected to the internet (Saputra et al, 2021). The COVID-19 pandemic forced many Indonesian secondary math teachers to use e-Learning as an alternative to conventional classroom instruction, which presented a significant challenge. Their biggest obstacles also came from the perspective of the learners, for example, shortage of skills and knowledge in the use of e-Learning, along with a lack of equipment and an internet connection (Almanthari, Maulina, & Bruce, 2020).

One of the reasons given in a report on why teachers were not ready to use incorporate ICTs in the classroom is a lack of competence, expertise, independence, capabilities, access, schedule, resources, preparation, as well as technical support, which together make up essentially everything needed to engage in e-Learning (Mncube, Olawale, & Hendricks, 2019). Although knowledge and skills may exist in some cases, research indicates that adoption and use do not necessarily result from these factors (Thaufeega, 2016).

2.5.3 Connectivity

In total, 6 949 schools were connected by 2019 according to the Independent Communications Authority of South Africa, which was constructed in 2021. According to the National Implementation Strategy for Education, one of the focus areas is connectivity, and the nation's ICT policy framework should push for at least some level of connectivity in every school, this saw the distribution of laptops and modems to school principals for the Schools under study. The *White Paper on e-Education* also acknowledges that every teacher and learner in general must have access to the necessary technological support and that schools should be connected to the Internet (Mwapwele et al., 2019).

Despite the increasing prevalence of connectivity and Internet access, the proportion of linked schools is still quite low in some places. The White Paper from 2004 acknowledges the value of having access to the Internet and how it can be used in both teaching and learning. Statistics show that 6% of the study's schools have classroom computers connected to the Internet but rarely use them, based on findings from the ICT in education survey and the schools that responded. To close the digital divide and advance the knowledge economy, the department needs to provide access to computers and the Internet. However, as of right now, schools in most parts of the nation hardly ever use computers for instruction or learning (Mwapwele et al., 2019).

Major challenges identified in this research is a lack of internet connection, which limits teacher preparation and prevents the use of digital devices. Therefore, the study's findings are similar with those of Khumalo et al. (2015), who found that poor or no internet

connectivity, lack of electricity, insufficient instructional resources and the absence of ICT infrastructure all had a negative impact on the use of e-Learning. Therefore, providing internet access to schools and rural areas greatly enhances ICT for Development (ICT4D) activities in any developing country (Dalvit, et al., 2014).

Jun (2005) argues that a strong Internet connection and enough computers for participants are all that are needed for successful e-Learning, rather than a substantial infrastructure. Similarly, Fathaigh (2002) points out that access to a reliable and stable internet connection, in addition to a computer or other similar device, is a fundamental requirement for online learning. However, Pirani (2004), has a different view. He contends that institutions should provide enough and dependable technical infrastructure for e-learning initiatives, that learners and teachers should have technical expertise to use e-learning tools, and that teachers should redesign their lessons in order to successfully integrate e-Learning into their pedagogy.

2.5.4 ICT infrastructure

Government public schools especially the no fee schools in rural parts of South Africa, lack the necessary infrastructure to support online education. Although there are computer labs in some of these schools, the computers are mainly donated by the game reserves around the area, these machines are not only infrequently used for academic purposes but also not maintained properly. Demonstrating that giving out devices without training on their advantages results in people not using them. E-learning is fast shifting from being a luxury to a necessity in Africa as the demand for distance learning and higher education rises. However, a large number of people continue not having access to adequate ICT infrastructure, making e-Learning difficult to deliver (Masonta et al., 2015).

ICT infrastructure also needs to include and provide access to internet-connected devices (such as laptops and tablets) and telecom infrastructure (Masonta et al, 2015). These are infrequently available to rural learners who have little to no access to television, mobile technology, or the internet, highlighting the disparities in access to technological devices and services. Certain schools in Gauteng received tablets and other devices that can be used for online learning, but some rural schools, particularly those in Mpumalanga, had

not receive them. Phomolong Secondary School in Tembisa was one of the schools that received tablets as part of the paperless school's pilot programme in 2015, however, tablets and computers are sometimes stolen. Resulting in access challenges, as student are not able to access digital content. This leaves them in the same situation as some learners in rural public schools who were barred from participating in learning activities during the hard lockdown, due to a lack of access to the tools required for online learning, which contradicts Dube (2020) on social justice and social involvement of all learners in educational activities.

ICT infrastructure has been identified as one of the focal points in the National Implementation Strategy for e-Education (Padayachee, 2017). Because it is crucial for the e-Education policy's implementation. Additionally, it provides chances to access learning remotely, correct historical injustices, and improve teaching and learning standards. There have been improvements made in the infrastructure for ICT in schools, but they are still insufficient. The government concentrated on supplying underused computers to schools. This supports the claim that simply providing computers is insufficient to ensure that technology is incorporated into teaching and learning activities. As the schools under study have computer labs which they do not use. With the exception of KwaZulu-Natal and the Free State, only 12 082 (71%) of schools had one or more computers in 2010 and only 2 587 (15%) of classes had working computers (DBE, 2017).

Isaacs (2007) made a passing reference to the fact that, whilst also South Africa has such an e-Education policy, it only applies to school systems and Technical Vocational Education and Training (TVET) colleges. As a result, there has only been a 22% computer penetration in all public schools, while ICT access is growing significantly at higher educational institutions. Isaacs outlines the difficulties that must be addressed, like the need for a diverse ICT policy that not only addresses all areas of education but also serves as a coordinating force for numerous initiatives. Additionally, important technological aspects of e-Learning readiness include software knowledge, comfort using technology, technology reliability, the ability to logon frequently, and access to technology off-campus (Greaves, 2008).

2.6 ICT teacher development

To equip teachers with the skills and expertise necessary to use technology in the classroom, as such the government must prioritise teacher professional development. In order to use technological devices proficiently and to help and teach learners to use these ICT resources in a creative way, teachers in South Africa need more training and development. The degree of teacher's comfort in using technology in the classroom affects how well learners can access ICTs and comprehend digital information. The opposite, which is more typical in many rural areas, is having instructors who do not use ICTs out of a lack of confidence and instead rely on traditional techniques (Daly, Pachler & Pelletier, 2009).

2.6.1 Guidelines for teacher training and professional development in ICT

To execute the recommendations in the *White Paper on e-Education*, a national framework for ICT teacher development was required (DBE, 2007). To help educators understand how different aspects of teacher development are interdependent. This includes managers, policymakers and service providers. According to this document, they will need support in their capacities as learning intermediaries, consultants, and program designers, as well as in their portfolios as managers, users (both learners and teachers), evaluators, and subject matter experts. Additionally, they will need the necessary expertise, capabilities, principles, and attitudes in order to integrate ICT into teaching and learning.

It also acknowledges that teachers' ICT expertise and knowledge development is a crucial component ongoing teacher development, as stated in South Africa's National Policy Framework for Teacher Education and Development. Three components of the comprehensive approach to teacher development are taken from the T3 Core Curriculum for Telematics in Teacher Training of the European Union (Davis and Prosser, 1999). A pedagogical component denotes awareness of the possibilities for ICT-based educational activities in a local curriculum setting, as well as its implementation. A technical dimension is defined as the ability to choose, utilise, and sustain a variety of ICT resources as needed to improve one's performance both personally and professionally; and the desire

to advance one's abilities and knowledge in response to new advancements. An aspect of networking and collaboration that incorporates a critical understanding of the benefits of cooperation amongst partners and learning networks; the capacity to produce and take part in communities of practice (Valencia-Molina, Serna-Collazos, Ochoa-Angrino, Caicedo-Tamayo, Montes-Gonzalez and Chavez-Vescance, 2016).

2.6.2 Professional development framework for digital learning

This Framework's objective is to infer suggestions for professional growth, particularly to ensure capable teachers who "use ICTs to enhance teaching and learning," as well as both managers and support staff who can assist educators in acquiring digital learning capabilities (DBE, 2007). Thus, the main target population for this Framework includes educators, school administrators, e-Learning experts, and subject-matter experts. However, the Framework's implementation will involve role players at all levels. This framework's objective is to assist educators in honing their abilities to support learning with digital tools and resources. The purpose of the framework is to give proper guidance for professional development for digital learning in an educational system that aims to increase access, equality, quality, ensure redress, and effectiveness while taking the rapidly changing technological landscape into account.

Goal 16 of the DBE Action Plan for 2019 binds the department and its partners to “Improve the professionalism, teaching skills, subject knowledge, and computer literacy of teachers throughout their entire careers, of which there has been significant improvement as most teachers are able to use basic computer application. It is for this reason that one can argue that computer literacy amongst teachers has improved as they are able to use basic applications such as MS Word”. This goal relates to professional development in digital learning (DBE, 2010). The following two priorities have been determined: "Externally provided in-service training must improve and be made more accessible in order to establish a stronger enabling framework for teacher-initiated professional development activities and professional learning communities," the report states.

In contrast, the Integrated Strategic Planning Framework for Teacher Education and Development (ISPFTED) requires the DBE and its partners to invest in digital

technologies to aid in strategy implementation. The ISPFTED emphasises the importance of developing teacher expertise and practice guidelines for each subject or area of teacher competence, as well as the formation of Professional Learning Communities (PLCs) to improve teacher professionalism (DBE, 2011). The Professional Development Framework for Digital Learning takes a new approach to professional development for teachers and all stakeholders, with a greater focus on the application of digital tools and content sources to support better learning outcomes and increased learner performance across the curriculum.

2.6.3 Managing ICTs in South African schools: a guide for school principals

In order for principals and senior school administration to effectively lead their schools, the guide for ICT management in South African schools aims to provide them with knowledge of the use and management ICT resources. The manual also discusses some of the disadvantages of using PCs and similar equipment for educational purposes. The authors hoped that school governing bodies and other senior members of the school staff would find it useful (SAIDE, 2003).

The South African Institute for Distance Education (SAIDE) investigated South African schools' use of computers for both teaching and learning in 2002 and 2003 (SAIDE, 2003), it was supported financially by the Royal Netherlands Embassy. This project, which examined computer use in 21 schools, found that principals are frequently misinformed about what ICTs can and cannot do, which is one of the reasons ICT use in schools fails. This frequently limits their capacity to supervise the use of ICTs within their schools. This only emphasises the importance of principals and other top administrators receiving assistance in coordination of computer integration and relevant data are being incorporated into their schools' teaching and learning processes. However, without careful planning and analysis of what can be supported financially, in terms of infrastructure, and human resource capability, there is little chance of successfully integrating the use of ICTs into the education system (Bialobrzeska and Cohen, 2005).

In order to effectively implement ICT in schools, proper budgetary planning and staff development are just as important. ICT integration in the classroom has an immediate

impact on teachers. New schedules must be created to accommodate the usage of computer resources, staff must be trained, equipment must be maintained and serviced, and curricular challenges must be resolved. These issues have implications on money, time and teaching. Professional growth and training frequently suffer from two flaws: that teachers only need to have rudimentary computer skills and that a single course is sufficient (Bialobrzeska et al, 2005).

Understanding computer operations and fundamental software is just the start. Where the training should really start in making the connection with teaching. If teachers are unfamiliar with computers and do not view them as useful tools in the educational process, they will not use them. It takes a thorough understanding for instructors to be confident to incorporate computer utilisation into the curriculum. Software education is much more challenging than simply knowing how to use it. Additionally, incorporating ICT into the curriculum frequently calls for professional advancement in teaching techniques in addition to a foundational understanding of computers (Bialobrzeska el al, 2005).

2.6.4 Guidelines for schools: ICT hardware specifications

These guidelines are intended to help managers, administrators, and educators deal with the quick evolution of technology available to support educational activities. ICT is essential for e-Education implementation because it enables learning, corrects imbalances, and improves teaching and learning quality. As we work to make high-quality education accessible, these guidelines are meant to ensure that ICT technology quality standards are upheld. To establish organised procedures for managing hardware gifts and purchases made by provincial education ministries and institutions, the Hardware Specifications were developed (Ntolwana, 2013). At the level of further education and training, personal computers must be used to teach IT and computer application training courses (Grades 10, 11 and 12). At least one computer lab should be provided to every school, with access available to learners in grades R through 12. This is the current goal of provincial education ministries. Even if this is accomplished, the amount of computer time that many learners have access to will prevent them from meeting the requirements for Computer Application Technology (CAT) and IT as well as curricular integration.

In the ICT-enabled classroom of today, the following hardware is frequently needed: PCs: These are typically "fat-client" systems with standalone workstations in educational institutions. Due to financial restrictions, several provinces are considering "thin-client" setups like servers and dumb terminals. The majority of printers are monochrome, though colour printing is an option. Servers: These are typically "fat-client" PCs used as resource servers (e.g. optical drives). Software for systems, utilities, word processors and spreadsheets are all included in educational software (DBE, 2014).

2.7 Lack of clear policy guidelines on the integration of ICTs into learning and teaching activities

The ICT-integrated processes of teaching and acquiring knowledge are of the e-Education policy's strategies for changing the educational environment. The policy specifies the instruments needed and who will execute it, but it does not specify how it will be done. It does not have a clearly laid out strategy for incorporating ICTs into activities for teaching and learning. It is also unclear what many different duties the authorised stakeholders should be responsible for in order to guarantee that the policy is correctly applied. ICT integration is successful when a school has an ICT vision and policy, ICT proficiency, developmental educational values, and teacher professional development (TPD). When these components are absent and a holistic strategy— an all-encompassing strategy is used that ignores the diversity of South African schools, it fails (Meyer & Gent, 2016).

Even though these programs are usually under the long-term supervision of the departments of education, there is occasionally a lack of a clear integrative strategic direction (or should be). Additionally, the objectives of ICT in Education are vaguely stated and do not correspond to practical steps toward a reachable goal. Many initiatives lack in practice a clear understanding of their objectives (Ostrowick, 2016). Many organisations also keep concentrating on improving learner scores without providing a clear path from the current state to future success.

Due to the lack of distinction between "policy" and "strategy" in a particular setting with responses, provinces are influenced to create their own strategies that are separate from

national programs. In addition, the deployment of ICT for education is driven by the objectives of the solution providers in the absence of clear guidelines and integrative methods (Ostrowick, 2016, Marais et al, 2016). As a result, technology is adopted partially and dispersed at random. The practice of "perpetual piloting" cannot be sustained over the long term for projects. At every level of the structure, integration and alignment are required. This suggests that provincial plans, which are made specifically to address the issues and conditions that are particular to each province, must accept and incorporate national strategy and policies.

Impact and execution of the initiative still need to be determined while it is still in the planning stages (Meyer & Gent, 2016). Although a strategy and a policy exist, they are poorly coordinated, implemented slowly, and have a small capacity. Uncertain goals and a lack of an integrated system-wide plan are present. The educational system must be improved in key areas, such as a greater emphasis on rural education, skills-based learning, teacher training programs, and school management (Van der Berg, Taylor, Gustafsson, Spaull & Armstrong, 2011). System-wide transformational leadership must be prioritized, and ICT-enabled appraisal must be taken into account.

For illustration, the Gauteng Department of Education (GDE) neglected to adequately inform implementors on how to adhere to the stages for successful implementation; as a result, the ADDIE model was not fully utilised by GDE due to inadequate planning and a lack of research before the project was implemented. ADDIE (analysis, design, development, implementation and evaluation) is a learning development model used by trainers and course designers, it is used to make complex course or curriculum programmes. The GDE, however, claimed that they had used the ADDIE paradigm in the planning documents. The project's implementation phase, however, failed because the model was not applied properly. The GDE was required to evaluate the district's school types, anticipate any problems, and offer potential solutions during this phase. However, GDE's one-size-fits-all approach prevented the project from being successfully implemented (Msiza, Malatji, & Mphahlele, 2020).

2.8 Monitoring and evaluation tools for e-Learning

Ames and Miller (2005) suggests that monitoring and evaluation should be considered when planning projects and provides a summary of the actions, responsibilities, and outcomes required to implement a successful M&E strategy. To track outputs and results, this includes the use of pertinent, useful, and quantifiable indicators. To prevent potential issues with "buy-in" and dedication later in the process, they advise identifying and including key stakeholders in M&E decisions. In order for the educational system to transform and for learners, educators, and members of the general public to benefit from such advancement in schools, policies can offer a justification, a set of objectives, and a vision. An evaluation of numerous governmental ICT policy documents (Kozma, 2010) identified three additional, tangentially related reasons for ICT-based transformation. These broad generalizations could be termed "strategic policies." Strategic policies may encourage the use of ICTs for pedagogical change, social development, or economic growth.

The ICT for Education Policy recognises that rigorous Monitoring and Evaluation (M&E) by all stakeholders is required for policy implementation and lists M&E as an area of priority. It implies that the goal of M&E is to investigate and advance blended learning, learn from past mistakes, improve execution and service delivery, analyse and distribute resources, and allow them to oversee all tasks and answer to relevant parties. Similarly, the Implementation Plan states that the goal of a monitoring procedure aims to assess the effectiveness of ICT in schools.

2.9 Teacher perspective on the integration of ICT into learning and teaching

Beyond ICT training and political will, the government needs to deal with the perceptions of teachers when it comes to ICTs. Because, their incorporating ICTs into educational activities is dependent of their perceptions. Thus, it is important to comprehend teachers' attitudes and perspectives because they will be carrying out the implementation of the e-education policy. Shambare, Simuja, & Theo, (2022) assert that it is crucial to comprehend teachers' attitudes toward using ICTs for the reason mentioned above. This is because before any programme is implemented, “teachers are the key stakeholder

group in any endeavor to incorporate ICT into schools," and their perspectives of any educational ICT tool must be carefully considered and understood (Li, 2007). According to research, teachers' attitudes toward ICT have a significant impact on whether they accept and integrate it into their lessons as well as whether they would do so (or not). Without this effort, ICT resources risk being neglected or underutilised.

The research demonstrates how enthusiastic teachers are about incorporating ICT into their classrooms. A study was carried out in the Joe Gqabi region of South Africa to look at teachers' attitudes and opinions regarding the incorporation of e-Learning into educational activities. Most educators, according to the survey, think that ICTs are beneficial for both teaching and learning. However, opinions varied according to the caliber of the training received and government support. Demonstrating that with adequate training and support most educators feel comfortable incorporating ICT into learning and teaching. As a result, the study recommended that teachers get more ICT integration training and support (Shambare et al, 2022)**.**

Similar studies were also undertaken in Indonesia to evaluate teachers' perspectives and motives for using ICT in classroom activities (Mahdum, Hadriana, & Safriyanti, 2019). The study's findings were comparable to those published by (Fitri & Putro, 2021), who discovered that many of teachers possessed a positive outlook about integrating ICT into their work. In contrast, studies on the application of tablets in Greek secondary schools revealed conflicts between ICT policies and school rules because these institutions forbade mobile device use in school environments. Mobile phones are not allowed on school property, which is also the case at the schools under investigation which works against the e-Education Policy. Aside from this anxiety, teachers were excited to integrate ICT into their classes (Nikolopoulou, Gialamas, Lavidas, & Komis, 2021).

Another study, by Taghizadeh and Hasani (2020) found that although many teachers expressed an interest in participating in technology-based professional development programs, they were not provided with training courses on how to utilise technology in their classes. To prepare, teachers for deployment with a solid technological strategy, it is crucial to choose the start date and e-Learning model. This is because teacher attitudes

and resistance to change, training flaws, and a lack of access are obstacles to effective technology use (Njagi, 2013). According to the findings of the research by Taghizadeh and Hasani, the majority of teachers were willing to take part in programs for professional development based on technology, to aid in integrating technology into the curriculum. In comparison to traditional teaching methods, most teachers believe that ICT-assisted education is more effective and simplifies the teaching of complex ideas. They also believe that ICTs make teaching more successful and improve their jobs.

2.10 e-Learning from a global perspective

Early studies used a positivist approach to analyse the consequences of e-Learning, specifically on learning and maturing of specific skills, by contrasting a class that uses computers with a class that doesn't and the intention will be to demonstrate that computer users learn more quickly than non-users. In most nations, the structure and daily dynamics of the classroom have not changed despite the addition of computers to the classroom and adjustments to teaching techniques (Cuban, 2001, Mc Ginn, 1997).

Significant reform proposals have been made for the educational systems of Taiwan, Finland, the Netherlands, Norway, and Singapore. The reforms put an emphasis on ICT training and how that would affect ICT integration while concentrating on what and how learners learn (Kozma, 2008). The lockdown in the Netherlands caused a significant gap in the way that pupils have been learning. Similar challenges were faced in Ghana and Malaysia where most internet access is unavailable to learners. There are differences between the north and south of Italy in terms of accessibility, platform types, and device availability. Over 51% of pupils frequently attended video lessons on the northern side, where classes continued using cutting-edge platforms. In contrast, learners in the southern region were given homework that was graded online. While the 42% of South Italian families who lack access to a computer could not partake in online learning activities (Ferri et al, 2020).

Sanchez, Salinas and Harris (2011) conducted a study in South Korea and found that, the country has experienced exemplary growth and development in its economy since the 1970s. The nation integrated ICTs into the education sector in the early 1990s as a

result of focusing on education and its use in promoting industrial expansion while educating the populace to move toward being more technologically advanced. Globally, South Korea is regarded as a pioneer in ICT education. ICT was incorporated into curriculum exercises and pedagogical methods, and in the classroom to a much greater extent than in other countries, improving quality and equality. Meaning that by promoting the adoption of ICT in every school, South Korea has achieved its significant organizing role in the sector components of the educational structure. While facing inequality in both the public and private sectors, Chile has struggled to effectively communicate its plans to incorporate ICT into the curriculum across the board. Chile is renowned for its policy initiatives and excellent outcomes in the expansion of education-based technology. ICT integration in education generally and teacher ICT training. Globally speaking, South Korea is praised for its development in the field of ICT. South Korea has established itself as a world-wide leader in e-Learning studies as well as ICT-based education and training (Sanchez et al.,2011).

By increasing teacher ICT training and integrating digital technologies of a new generation into the educational system, the Chilean government has been attempting to close the gap known as the “digital divide”. To improve the standard of education, they have created the Educar Chile Web portal in addition to purchasing more computers and using ICT in the classroom (The goal of this portal is to provide tools, systems, education, and information experiences to both teachers and learners) (Sánchez & Salinas, 2008). Nevertheless, despite the efforts of the government, Chile's educational system and economic development do not heavily rely on technology. As in South Korea, the government does not share a common vision for how ICT will be integrated and what role it will play in the nation. South Korea has grown its ICT sector, particularly in the hardware sector, creating an environment that encourages innovation and allocating resources to support educational infrastructure (Sanchez et al., 2011).

China and Greece were examined with a focus on the pre-school level, which is an early stage in the education system (Liu, Toki, & Pange, 2014). Their findings demonstrate how far behind South Africa is in integrating ICTs into all levels of education. It goes without saying that we live in the digital age and a knowledge-based society where ICT is crucial

to every aspect of our lives, especially education. As a result, many nations have regulations and investments in place to support ICT-related hardware, software, internet access and teacher education. These countries acknowledge the of ICT systems in education (Hepp, Hinostroza, Laval, & Rehbein, 2004).

2.11 Theoretical framework

The research is based on the developmental theory looking at improving the standard of education and bridging digital divide through ICT integration, thus enabling learners to take an active part in the information age by being able to use ICT and develop their skills. This will also enable them to use e-government systems at the later stages of their lives. The study also looks at teachers continued professional advancement, especially in terms of preparing them to integrate ICTs into educational activities (DBE, 2007). The successful deployment of e-Learning depends heavily on teacher professional development, which includes ongoing support for ICT integration at the province and district levels through development programs on pioneering digital learning initiatives to keep up with emerging technology. The teachers must also be accountable for their own professional development by determining the areas in which they need to advance their careers and build their competencies, particularly regarding the use of technology in the classroom (DBE, 2007). AAAAII is an acronym that will be used to describe a set of tasks that inform the application of ICT integration within a classroom. The tasks are:

A- Accessibility

A- Adoption

A- Adaptation

A- Appropriation

I- Integration

I- Innovation

Accessibility in the sense of providing teachers and learners having use of the ICT equipment and resources necessary for e-Learning in support of the pedagogy. ICT tools are more easily integrated into educational activities when they are accessible. The capability of using ICTs, such as computers, in administration, management, and educational activities is something that both the instructor and learners must acquire once the tools and resources are available (Globakar, 2010). Adoption should be followed by adaptation to ensure regular integration of ICTs into lesson plans. The next step should be appropriation, where the teachers are now able to use ICTs holistically, understand the changes that are happening in the space of technology, and be able to respond to these changes through professional development programs. Finally, teachers should be innovative such that they are able to create new knowledge and learning environments that encourage and support the use of ICTs (Noor-ul-Amin, 2013).

2.12 Conceptual framework on e-education policy and integration of ICTS in rural schools

This research was conceptualised to the improvement of the adoption of the e-Education policy and consequently the integration of ICTs into educational activities. Learning in the basic education sector takes place in a classroom setting which makes it a social and interactive process. As both learners and teachers must be physically present to participate in teaching and learning activities (Alice, 2012). However, due to the advances in ICT and ultimately in education in the form of e-Learning, the government sought to integrate ICTs into learning and teaching in order to upgrade the standard of education, student skills and access to a broad variety of resources and technology.

Incorporating ICTs into the classroom would improve learners' educational experiences by allowing them to use and learn about ICTs. Everything hinges on the government's capacity to allow access to resources needed for e-Learning. Governments must also ensure that all teachers possess the expertise and abilities to use ICT for educational purposes with confidence. Most nations are still looking for best practices and solutions to the common issues of infrastructure, skills, connectivity, access to ICT tools, and ICT integration into pedagogy in the basic education sector (Nyanja & Musonda, 2011).

The nations that have completely included ICTs into teaching and learning activities had well defined objectives and did not only focus on giving schools equipment or computers; they also made sure that there was connectivity and that teachers are properly trained. Additionally, funds had been set aside by the government for ICT integration, due to the expense of acquiring, maintaining, and ensuring connectivity, particularly in South Africa, there is the issue of data costs. The budget is one of the issues that influences the supply of ICT tools. The lack of budget for ICTs at schools and the DBE generally has an impact on ICT integration, as access to ICT tools, the correct infrastructure, connectivity and ICT-capable instructors with the right training all requires finances. Most essential, the district must provide support for ongoing professional development as technology advances.

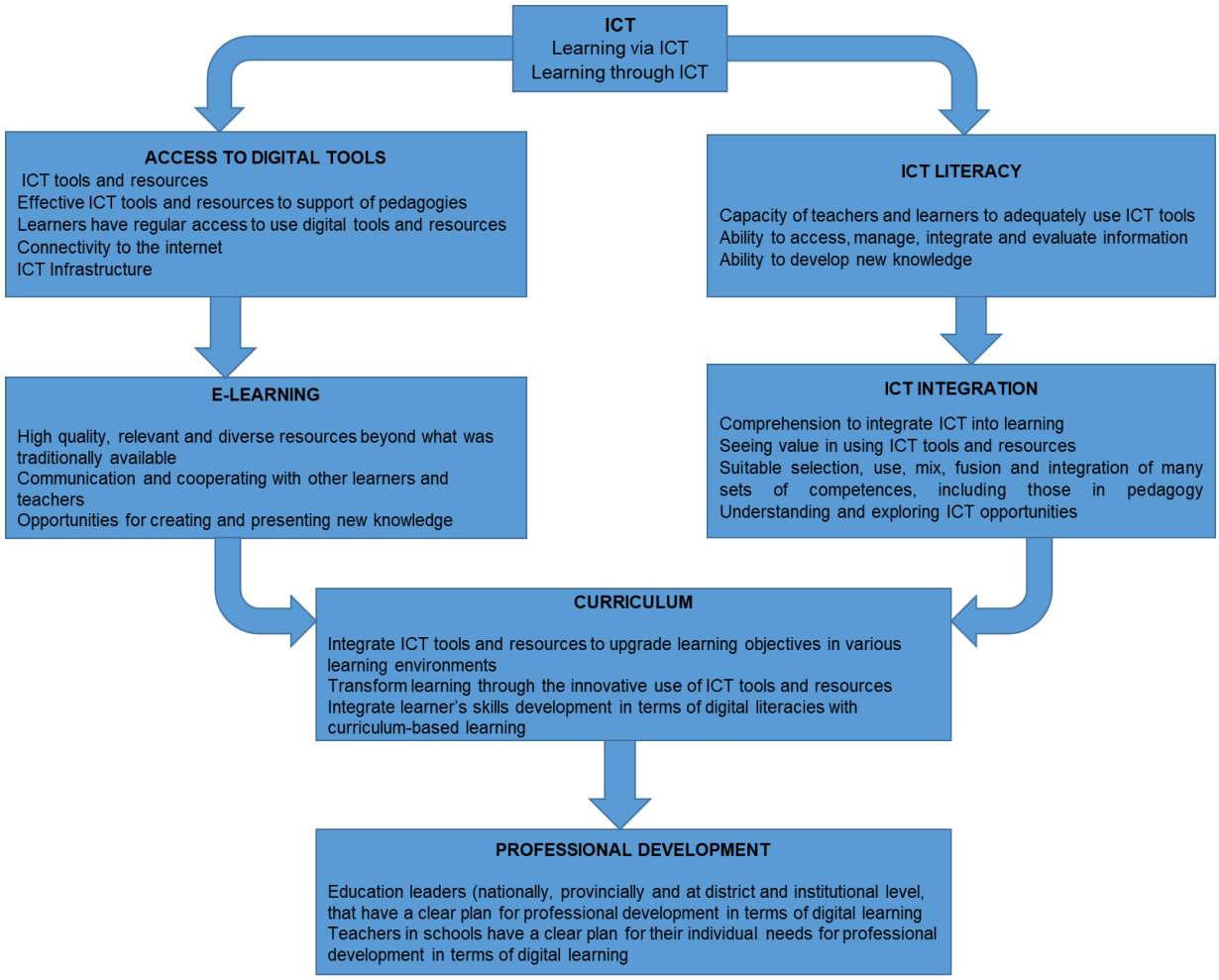


Figure 2.1: The conceptual framework on the implementation of e-Learning and integration of ICT in rural schools.

2.13 Summary

This section provides an extensive comparison of the literature starting with the definition of e-Learning because it was important to understand how it is broadly defined, as well as how the respondents define it. This has a bearing on its integration into learning and teaching activities as one cannot implement what they do not understand. The South African definition aligns with the communications definition of e-Learning and this was supported by the views of the respondent's definition of e-learning was associated with the use of cellphones, laptops and computers which basically mean that learning can be administered. remotely and on flexible times which is one of the benefits of e-Learning, e-Learning is one of the benefits of e-Learning, which must be governed by certain guidelines and goals as it pertains to the e-Education policies.

Notwithstanding the challenges that countries face in policy implementation, the challenges however, go beyond policy as illustrated in the literature such as the lack of connectivity, ICT infrastructure, skills and the need to train teachers to use ICTs. The literature has also indicated the significance of ICTs in promoting the integration of e-Learning in both developed and developing countries. However, the observations are that it seems much easier to integrate in well developed countries as they have all the tools, financial resources and infrastructure for e-Learning, while in underdeveloped ones, it is very difficult to integrate due to challenges such as infrastructure, ICT tools, budget deficiencies and lack of skills from the teachers hence the challenge in effectively implementing the e-Education policy in the schools under study.

CHAPTER THREE

MATERIALS AND METHODS

3 Introduction

This section describes the study's research methodology, the instruments used to collect and analyse data to achieve the study's objectives, and the methods used to maintain reliability and validity. It also describes the research design, study setting, sample population, and sampling methods used.

3.1 Research design

Khothari (2002), defines research design as a conceptual framework for conducting research, including the methods used to gather and analyse data relevant to the research problem. Harling (2012) described a case study as a way of investigating a phenomenon in its natural environment. The researcher adopted a case study approach due to their descriptive nature and ability to obtain deeper understanding of people's behaviour.

The study uses blended research design to address the problem statement and achieve the objectives outlined in the study. Both qualitative and quantitative research approaches are used to acquire data regarding the elements that prevent the implementation and effectiveness of e-Education at the district. The researcher uses mixed methods because they allow for a deeper exploration of a research question, analysis of data, and presentation. One focuses on numerical measures and allows for the data to be presented graphically by percentage, and the other provides a better understanding of a research problem than either approach alone. The use of mixed methods motivated the use of the transformative paradigm to understand the factors that impede the implementation of e-Education in an attempt to promote social justice and bring about transformation in education, as alluded to by the results presented in Chapter 4, which pertain to the challenges and the support that government can provide towards e-Education. The study will consist of desktop study, questionnaires, interviews, and observations.

3.2 Research setting

The study was carried out in Mpumalanga Province, Bohlabela district which comprises of 16 education circuits including the Manyeleti Education Circuit, which was the circuit under study specifically the four schools in Hluvukani village. The schools have an average of 35 teachers each, depending on the enrolment and 17 teacher assistants combined. It caters for learners from Hluvukani and neighbouring villages. On average, there are about 400 learners per school, which results in overcrowding in some classes.

3.3 Sample and sampling procedure

Sampling is among the most crucial steps in the research process, because it gives confidence to the data collected (Pholoto, 2018). According to Katz (2006), Sampling is a technique for selecting sets of units from a population in a specific area to gather information that can be interpreted and analysed. Sampling is classified into two types: probability sampling and non-probability sampling. Non-probability sampling is purposive whereas probability sample advocates for a sample to be selected randomly or by chance, with the view that the sample is representative of the general population to accomplish the goals of the research.

According to Satishprakash (2020) the population is the set or group of all the units that fulfills the requirements for inclusion in the study which the research findings will be applied. The population consisted of teachers, educator assistants and principals. A sample was drawn from the population, according to Gupta and Gupta (2022), a sample contains a smaller population from a larger group from which the data will be collected to predict and test the hypothesis. The sample included 33 teachers, one departmental head, two principals, and 14 educator assistants who were chosen on purpose because they were considered appropriate to offer beneficial and relevant information to the study, and to allow the study's generalisations to be made to the population.

Purposive sampling was used to select the study area as this method involves the researcher directly choosing the area and schools from which to collect data as they could furnish the relevant information which simplified the whole sampling process, thereby saving time and resources. According to Parahoo (2014), purposive sampling is a

technique where researchers intentionally select participants based on their ability to furnish the required information and rich data.

3.4 Data collection

Prior to going into the field, the researcher sought approval from the Mpumalanga Department of Education. Data was collected in Manyeleti Education Circuit, specifically from schools within Hluvukani village in Mpumalanga. Data was collected at Mdluli High School, Mugena High School, Nwamacingele Primary School and Malwana Primary School respectively, to identify the factors that impede the implementation and effectiveness of e-Education at the district level. Questionnaires were personally distributed to subjects that were not willing to complete the online survey. A link was forwarded by the researcher to other subjects via WhatsApp and requested them to distribute the link amongst their colleagues that might be keen to participate in the study. The data was gathered over a three-month period.

Data was collected in two stages:

Stage 1: A desktop study was conducted to gather background knowledge and secondary data regarding the elements that hinder the implementation and effectiveness of e-Education at the district level. To support the data, a review of pertinent literature was done. This stage was important because it helped to establish the study's theoretical framework and identify earlier trends in the application and of ICTs in education.

Stage 2: The study made use of both primary and secondary data. To collect primary data, purposeful sampling was used, in which individuals and locations were chosen with the goals of the study in mind (Leedy, 2013). Observations, surveys, and open-ended interviews were utilised to gather primary data.

3.4.1 Types and sources of data

This study collected information about the factors that hinder the implementation and effectiveness of E-education at a district level using primary and secondary data. Direct field observations, questionnaires, and interviews were utilised to gather primary data.

Secondary data was obtained from other researchers' previous work, which was documented in journals, books, the internet, newspaper articles, conference presentations, and government and non-governmental organization (NGO) reports.

3.4.2 Primary sources

3.4.2.1 Questionnaires/surveys

The primary tools used in the study to collect data were questionnaires due to the various benefits they present, such as being affordable, being free from interviewer bias because responses are given in the respondents' own words and providing enough time for respondents to give thoughtful responses (Rowley, 2014). The researcher randomly administered the hard copy questionnaire to parts of the sample population which was not able to complete the online survey. Due to the fact that they are delivered and collected by the researcher, self-administered questionnaires typically have a high response rate (Nyambane, Nzuki & Korir, 2020). This perspective is supported by Suzanne and Priscilla (2004) who state that questionnaires can be easily administered, and they are effective for evaluating respondent knowledge on the topic. Section A of the questionnaire examined the demographic information, Section B focused on general questions about e-Learning and Section C focused on the challenges of e-Learning (See appendix 1). The questionnaire responses would address the topic under investigation by describing the challenges and pointing out what can be done. Thus, data that exemplifies the AAAAII framework by emphasising access, adoption, adaptation, appropriation, and integration of ICT tools in schools, as well as innovation by examining if ICTs are used innovatively by generating new information and ways of teaching.

The online survey was designed via Google Forms and comprised of the same questions as the hard copy questionnaires. The online survey was chosen because it is the quickest way to reach a substantial number of participants simultaneously, and data is automatically collected.

3.4.2.2 Interviews

According to Kane (1995) interviews can be used to foster trust, convey empathy, gather extensive data, and offer a complete sense of the participant's perspective, in while also being able to be specially made to meet specific objectives. In this research, interviews were carried out in the form of a conversation between the researcher and respondents, in order to clarify questions and provide a brief explanation when handing out the questionnaire. Interviews are defined in this study as questioning and discussion with the goal of providing general information to respondents so that they understand the purpose of the questionnaire.

3.4.2.3 Observations

Observation can assist in providing descriptive answers and generally supporting hypotheses (DeWalt, 2022). Observations can be seen as a component of social life because most people are observers of their surroundings; however, in this study, they are used as a complementary method (Ciesielska, Bostromy & Ohlander, 2018). Observations were carried out according to study's objectives and some of the survey questions. They were more focused on the computer labs to determine the state of the labs, availability of computers, and whether there was a period during the school day when learners would use the labs, or lessons were conducted in the labs. A camera was used for photographs and a notebook for note-taking during the observations.

3.4.2.4 Secondary sources of data

Secondary data was also collected in this research from data available from other sources and work by other researchers on the same topic. The data comprised of existing literature regarding ICT integration in learning and teaching activities.

3.5 Data presentation and analysis

To analyse the data, it was captured using Microsoft Excel and statistical analysis was performed. Data analysis involved recording the data responses for each segment on a Microsoft Excel sheet labelled with the number of participants. The responses were then

recorded on the titled sections of the MS Excel sheets in accordance with the questionnaire. This data was obtained qualitatively and it was examined numerically as the researcher first studied the qualitative data thoroughly to uncover the key themes and ideas and then translated them into numerical data for further comparison and evaluation. The yes and no categories were recaptured, with “Yes” as 2, “No” as 1, and N/A as 3. The same responses were then added together to determine how many people answered “Yes” or “No”. These figures were then entered into Microsoft Excel to calculate the percentage and display the data graphically.

For the other categories, the data was analysed by clustering together similar responses and organising them into categories and themes (Thomas, 2003). To make the work more manageable, the categorised themes were coded and labeled with abbreviations. Data collected via Google Forms survey was captured on Microsoft Excel sheets alongside other responses and analysed as a single data set. Some of the data was summarised using visual graphs such as pie charts and bar graphs. With paragraphs beneath each graph explaining the results and analysing the participants' responses to make sense of the data shown in the graph in line with the “Yes” and “No” responses. Data gathered through observation was analysed descriptively, with photographs serving as visual aids.

3.6 Credibility and trustworthiness

To collect data for the study, an online survey and a hard copy questionnaire were used. Additionally, the researcher used observations focused on the infrastructure and computer labs at the schools to guarantee the credibility of the information presented. Observations allowed the researcher to validate the information provided because ICT integration is based on accessibility of ICT tools, connectivity and infrastructure. The researcher could therefore validate responses on the availability of computers and labs and determine whether they were used during school visits. The use of multiple data collection methods is commonly referred to as triangulation because it enables researchers to acquire a thorough knowledge about a phenomenon (Ghafouri & Ofoghi, 2016).

This ensures the dependability, transferability and confirmability measures are achieved by keeping a detail record of how the data was gathered and analysed to be able to have the same conclusions should the research be reproduced (Wagner et al., 2012). Records prove that data was indeed derived from participants rather than the researcher's constructions. Strategies were put in place to overcome the researcher's possible bias. Through reviewing the data via the lenses of theories and using multiple methods to collect the data (Nieuwenhuis & Smit, 2012).

3.7 Ethical considerations

Appropriate ethical implications were considered when collecting data to ensure that participation is voluntary and the aims of the research is clearly communicated also the advantages thereof. Additionally, information was provided to the participants about how the findings were going to be used (Merriam & Grenier, 2019).

3.7.1 Informed consent

For human subjects' research, informed consent is a moral and legal requirement. It entails informing a participant about all information as it pertains to the research that is required for the participant to decide, and the participant voluntarily affirms their intent to participate after receipt of the information (Nijhawan, Janodia, Muddukrishna, Bhat, Bairy, Udupa & Musmade, 2013). The study used surveys as instruments for data collection, this meant that the participants had to agree to fill out the survey before they were handed over to them. Moreover, there was a section for written consent on the survey to take part in the research. The consent section asked if they agreed to participate in the research, while the information sheet explained in detail, the aims of the research, measures to ensure confidentiality and anonymity, as well as the right to withdraw at any time.

3.7.2 Confidentiality and anonymity

The extent to which the source of information cannot be identified is defined as anonymity (Pfitzmann & Hansen, 2005). It varies from extremely high (difficulty identifying the source) to none (easy identification of the source); in essence, participants should not be identifiable. Furthermore, no personal information about the participants was disclosed

(Wiles, Heath & Charles, 2008). Personal information or details that could lead to the participant's identification were not shared in this study, and the results are presented in a way that does not link any participant to the information.

Confidentiality calls for the investigator to guarantee that any information gleaned from or shared by participants is utilised in a manner that upholds their dignity and autonomy and does not jeopardise the preferences of individuals or communities. Confidentiality and anonymity will be maintained throughout data collection, analysis and the reporting of findings (Bos, 2020).

3.8 Summary

This chapter was significant as it described how data was gathered, including the research design and methods used. Furthermore, the research setting was underlined, as was the average number of teachers in the schools under study. The population and sample size were carefully chosen to allow for meaningful generalisations about the population under study. Furthermore, the research tools were discussed and defended concerning why they were thought to be the best for the study. The chapter also covered various data gathering techniques before concluding with an initial notification on how the data would be presented and analysed.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter aims to present the findings from the administered questionnaire as results and answers in response to the study's developed objectives and methods. The information presented here was gathered from questionnaire responses to the study's research questionnaires. The chapter describes in-depth teacher perspectives, the availability of ICT tools and infrastructure, and the usage of ICTs in learning and teaching activities.

4.1 Demography of respondents

The demography of the participants that participated in the study that concentrated on factors that hinder the implementation and effectiveness of e-Education in Mpumalanga is summarised in **Figure 4.1**.

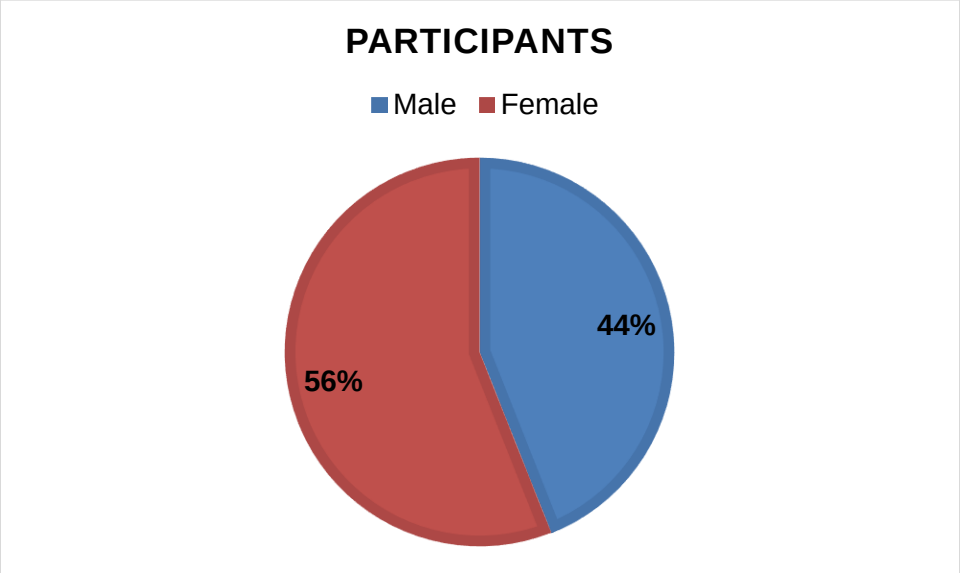


Figure 4.1: Demography of the participants.

As shown in the **Figure 4.1**, a total of 50 participants contributed to the objectives of this study, of which 28 were females and 22 were males, translating to 56% and 44% for females and males, respectively.

4.2 Challenges hindering integration of the ICT system in teaching and learning processes

4.2.1 Knowledge of e-Learning

The knowledge of participants with regard to e-Learning specifically their familiarity with the term within the schools in Manyeleti Education Circuit is shown in **Figure 4.2**.

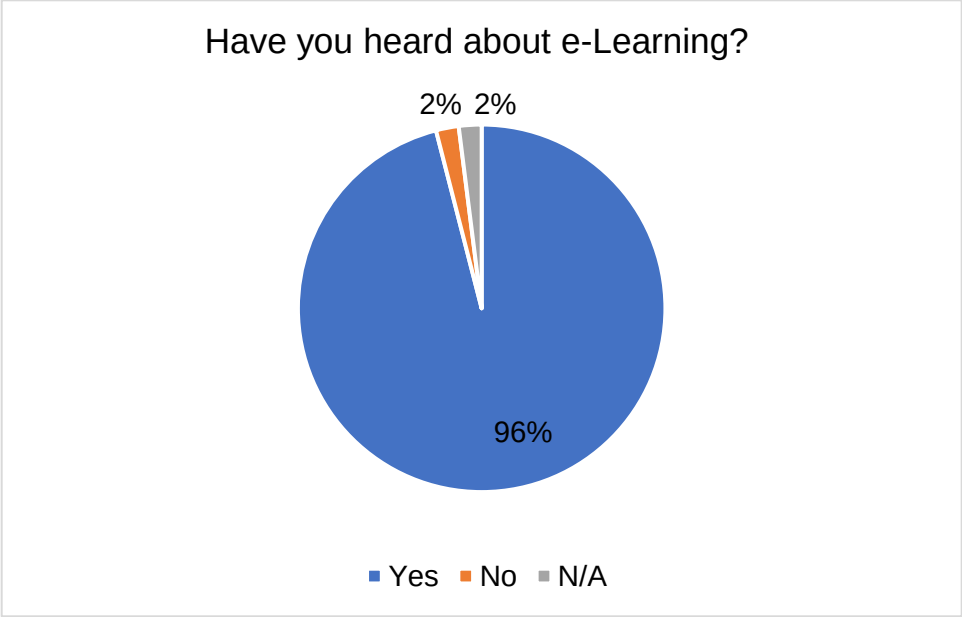


Figure 4.2: A summary of the knowledge of participants on e-Learning within schools in Manyeleti Education Circuit.

It was important to establish if participants are familiar with the term e-Learning as one needs to understand the term and have knowledge about tools used for e-Learning to be able to effectively incorporate it into educational endeavours (Machusky and Herbert-Berger, 2022). As shown in **Figure 4.2**, the knowledge of participants in terms of their familiarity with e-Learning was tested on 50 participants, of whom 48 said they had heard about e-Learning, one said she had not while another participant decided not to respond to the question. This translates to a total of 96% having heard about e-Learning and 2% not having the knowledge while 2% did not respond. However, when the participants were asked about what they understand about e-Learning, several definitions sprung up, according to their responses, e-Learning is understood differently, despite being

described in similar terms, as seen in the literature review, where different authors provided different, yet sometimes overlapping definitions of e-Learning. Some respondents defined e-Learning as learning that occurs online via computers, cell phones, and software via remote learning. E-Learning is also described as the facilitation of learning through the internet, which eliminates the need for paper and the need for physical contact. Others believe it is learning done through social media and digital platforms, electronic media, and virtual classrooms. This is not surprising given the advancements in social media platforms, particularly WhatsApp, where class group chats can be created to share information. Benefits such as flexibility and time-saving were also mentioned in the definitions. The definitions given above are similar to those that define and describe e-Learning as flexible learning which takes place remotely (Aldiab et al., 2017, Roman and Plopeanu, 2021, Machusky and Herbert-Berger, 2022).

4.2.2 Availability of computers

An illustration of the availability of computer labs as a mode of learning in the schools under study is shown in **Figure 4.3**

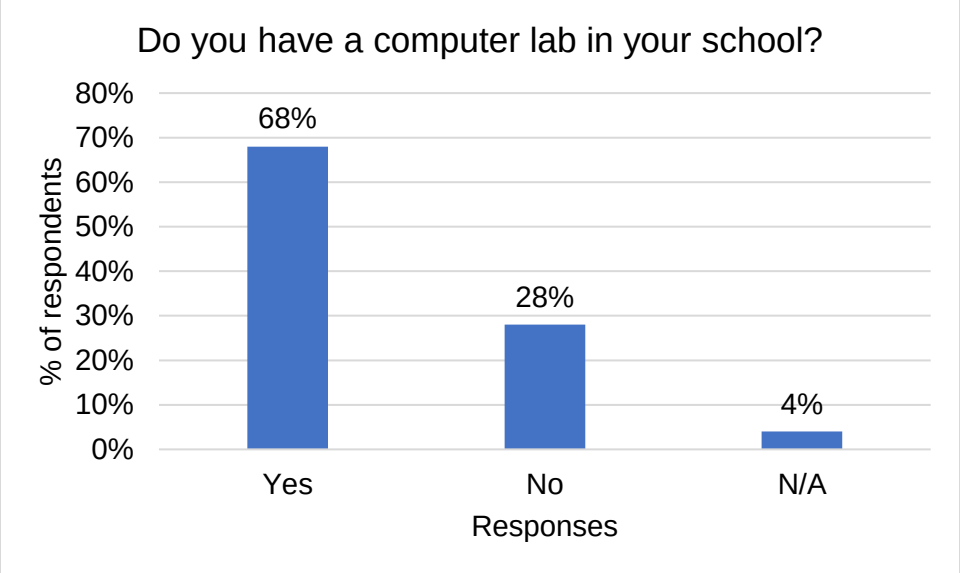


Figure 4.3: An illustration of the availability of computer labs as a mode of learning in the schools in the Manyeleti Education Circuit.

As shown in **Figure 4.3,** among the 50 respondents, 34 replied “yes” to having a computer in their school, 14 said that they did not have a computer lab, and 2 did not respond to the question. This translates into 68% having labs in their schools, 28% not having labs and 4% as those who chose not to respond. The findings obtained in this study corroborate what has been reported in the literature (Copeland et al., 2014, Hubackova, 2015, Kapenieks et al., 2015, Farhan et al., 2018) where schools perceive computers as the best mode in e-Learning whilst schools in low and middle income countries (LMICs) do not see the need for computers as an enabler towards e-Learning and this is attributed to the lack of knowledge concerning the benefits of using computers in educational activities, along with the expertise to teach with computers.

4.2.3 The usage of computer labs for learning activities

An illustration on the usage of available computer labs in the schools for e-Learning is shown in **Figure 4.4**.

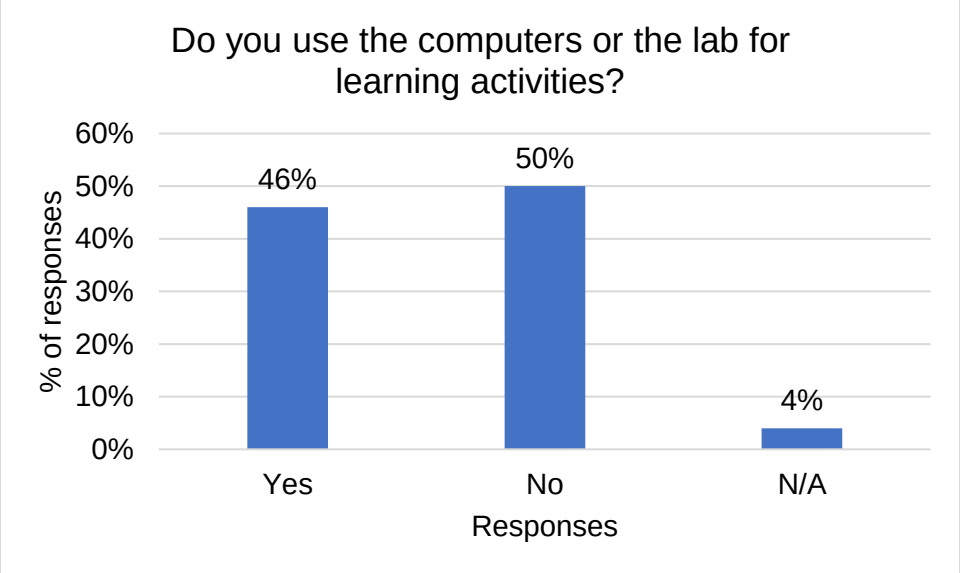


Figure 4.4: An illustration of the usage of available computer labs in the schools for e-Learning in the Manyeleti Education Circuit.

As shown in **Figure 4.4**, among the 50 respondents, 23 participants said ‘yes’, 25 said ‘no’, while 2 chose N/A, thus translating to 46% of the participants agreeing to the usage of the available labs in the schools. Specifically, the participants who mentioned that they

use projectors for their lessons, which means there is a certain technological element to their teaching. These participants argued that projectors, instead of iPads, might be a viable option for the government to enable rural schools to integrate technology into their lessons, as all learners will be able to follow the lesson. Moreover, providing iPad for all grades seems rather daunting and may not be the best option at this point, given high costs. Fifty percent of the participants said they were not using the lab in their school due to computers not having internet connections. Moreover, the labs cannot accommodate all learners in one classroom as the labs have a capacity of 15 to 25 computers while there are about 30 learners in one class. Some of the labs are outdated or they are not available in some cases. The 4% chose not to answer the question. Based on these findings, fit-for-purpose and regionally customized technologies will contribute significantly to addressing some components of e-Learning. This has been highlighted in the reviewed literature (Kapenieks et al., 2015, Farhan et al., 2018).

4.2.4 The use of technology in the classroom

An illustration on the usage of technology in the classroom as a mode of learning is shown in **Figure 4.5**.

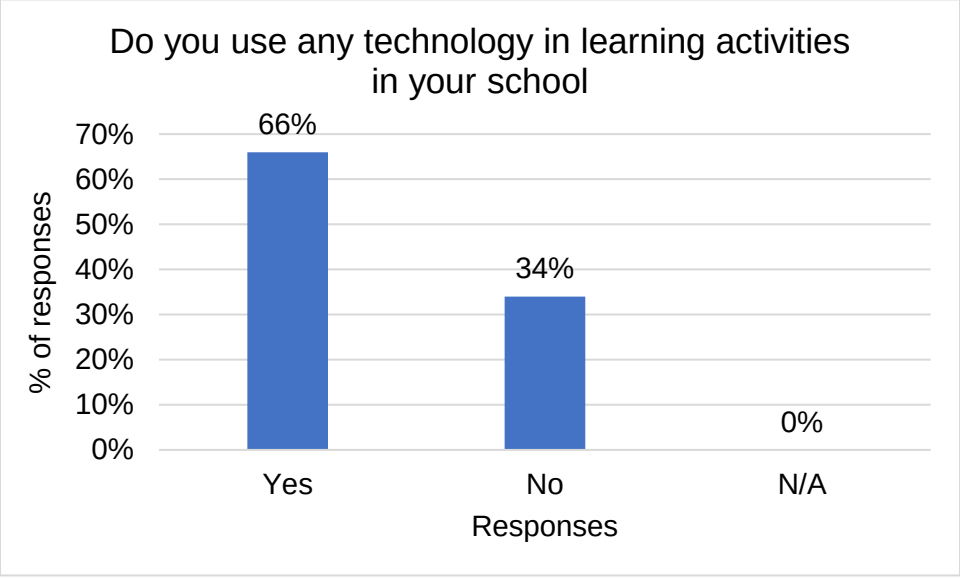


Figure 4.5: Overall perspective of the usage of technology in the classroom as a mode of learning in Manyeleti Education Circuit.

This segment looks at the incorporating of ICT tools into educational activities particularly in the classroom (Oztekin et al., 2013, Copeland et al., 2014). As shown in **Figure 4.5,** among 50 respondents, 33 agreed that they do use technology in their classrooms while 17 said they do not. The findings translate to 66% of participants who felt that using technology in the classroom is the best approach and 34% felt that not using technology in the classroom would still yield the same output. Those who agreed to using technology in the classrooms alluded that the government has provided iPads to grade 12 learners which they use as textbooks and to study mathematics. Those who said "no", cited that they still use the traditional method which requires them to go to the classroom during their allocated teaching times and they still make use of textbooks and chalk board. They cite insufficient resources for eLearning and the absence of a computer lab or a functional lab that can accommodate most of the learners as the main hindering factor. This corroborates what has been emphasised by other researchers (Kapenieks et al., 2015, Aldiab et al., 2017, Obidat et al., 2020, Elareshi et al., 2022, Machusky and Herbert-Berger, 2022).

4.2.5 Connectivity

An illustration of the internet connectivity in schools as way to enable e-Learning in rural schools is shown in **Figure 4.6.**

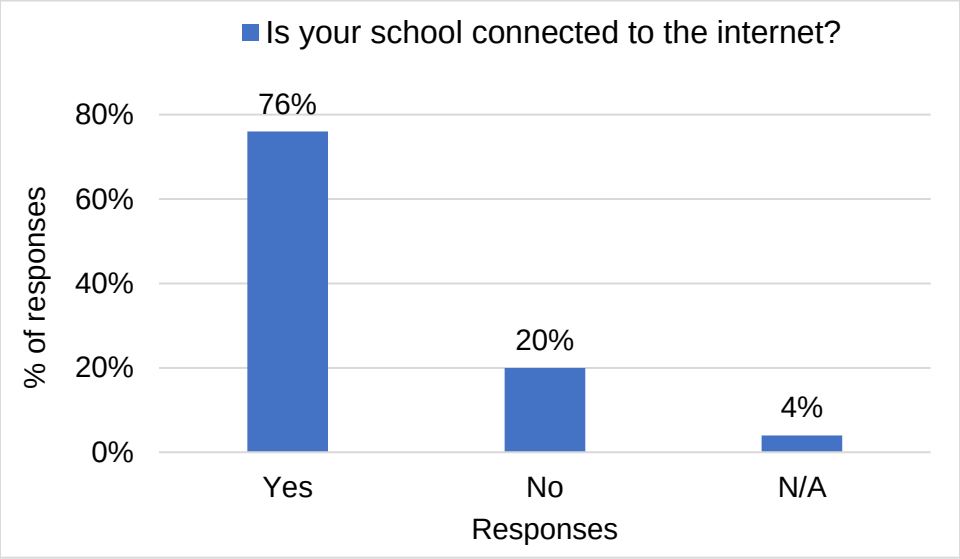


Figure 4.6: An illustration of the effect of connectivity in schools as way to enable e-Learning in rural schools.

Internet connectivity is essential for successful online learning, which necessitates not only access to the internet but a stable and secure internet connection (Kapenieks et al., 2015, Messaoudi et al., 2015, Aldiab et al., 2017, Farhan et al., 2018, Cotwright et al., 2020, Roman and Plopeanu, 2021, Elareshi et al., 2022). The COVID-19 pandemic emphasised the importance of internet access and stable networks to support e-Learning, as learning shifted to online platforms as a result of the shutdown and the need for social distancing (Roman and Plopeanu, 2021). This was not the case for the schools under investigation, as they were unable to learn due to a lack of connectivity, hence widening the digital division between those who have internet access and those who do not.

As shown in **Figure 4.6,** out of the 50 respondents, about 38 agreed that their schools are connected to the internet, which is about 76%, while 10 said that their school is not connected to the internet, (20% of the respondents) while 2 responds (4%) selected “N/A”.

However, internet connection is mentioned as one of the impediments to using ICT in the classrooms and schools at large, as well as one of the support areas they require from the government for LMIC. This gives the impression that they may have agreed that the schools are connected to an internet because of the computers and laptops that are used for administrative purposes and the modems that have been provided to the principals but the general school does not have connectivity. Also, some of the regions in rural areas does not have internet connection due to low signals, hence making e-Learning unviable for those areas.

4.2.6 Infrastructure for e-Learning

The illustration of the availability of infrastructure to enable e-Learning in rural schools of Manyeleti Education Circuit is shown in **Figure 4.7.**

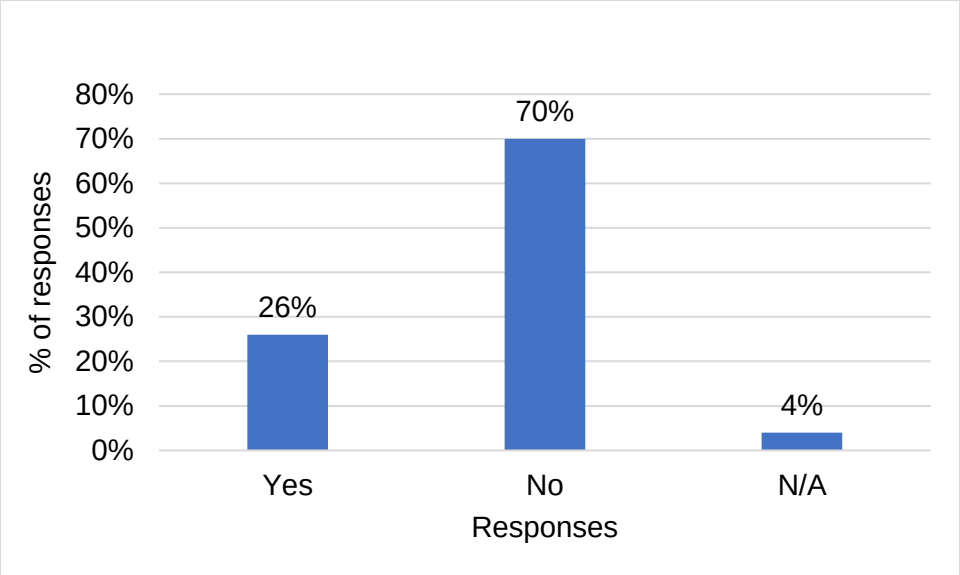


Figure 4.7: The illustration of the availability of infrastructure to enable e-Learning in rural schools of Manyeleti Education Circuit.

Infrastructure for e-Learning refers to the hardware's (servers and bandwidth), software (learning management systems), and support (training) to ensure the smooth running of e-Learning (Aldiab et al., 2017, Machusky and Herbert-Berger, 2022). As shown in **Figure 4.7,** out of 50 respondents, 13 said "yes", and 35 said "no", while 2 responded as "N/A". This translates into 70% of the respondents not having the right infrastructure for online learning, only 26% of the respondents agreed that they have the right infrastructure, and about 4% replied "N/A". This can be attributed to the lack of computer labs or where present, such computers are outdated and do not have the right software's and servers to effectively conduct online learning. They are just used for basic computer skills in a case where they are used. Some of the participants mentioned overcrowding in classes as one of the impediments for ICT integration. As they accommodate around 30 learners per classroom, while they do not even have 30 computers in the single lab at the school. Meaning the lab cannot accommodate learners in one classroom for a lesson in the lab, hence they continue with the traditional method as the environment is not conducive to integrate ICTs into educational activities and the curriculum.

4.3 Extent to which availability of ICT could have offered alternative learning methods during Covid-19

During the 2019 SARS-CoV turmoil, schools were closed especially during the hard lockdown, which halted learning and teaching activities in the schools under investigation. This was due to the fact that not all learners had access to computers and internet connectivity along with some of the teachers. Rotational school attendance was introduced as restrictions were eased; however, this introduced new challenges because learners had to be spread out throughout the classrooms to allow for social distancing. It would have been easier for the government to equip teachers with Ms Teams/Google Meet skills if learners had iPads or smart phones during the hard lock down including reliable connectivity. Of course, this would mean that learners must have email addresses via Gmail or google accounts, where the teacher could do quizzes and learners access them via the email, share materials with them via email, and have lessons via Google Meet hence easing the learning at different spheres of influence and learning stations.

In additions, most parents have smart phones with WhatsApp, which learners could use during that period to access learning materials hence enhancing continuity during the COVID-19 pandemic. Another option could have been WhatsApp, now one can call on WhatsApp, via video or voice call and then link all the learners and that will enable teaching for the teachers or facilitators. Furthermore, government through partnerships with the private sector could provide data to the parents for the learners to access learning resources and have those lessons on the most convenient platforms. This would have put learners and teachers in a better position to finish the syllabus as some teachers alluded that they were not able to finish the syllabus. This also places responsibility on the parent to ensure that their children learn and that they access relevant materials, which will make it easy for them to monitor iPads and assist children with learning activities. Of great concern is the socio-economic status of families in LMICs since majority of parents cannot afford to provide such platforms due to their indigent status that get subsidised by government, albeit other infrastructural issue that comes with connectivity in the region.

4.4 Kind of ICT tools used to access learning materials in school

4.4.1 Types of ICT tools

The preference of participants in terms of accessing information and learning materials between computers, laptops and cellphones is shown in **Figure 4.8**.

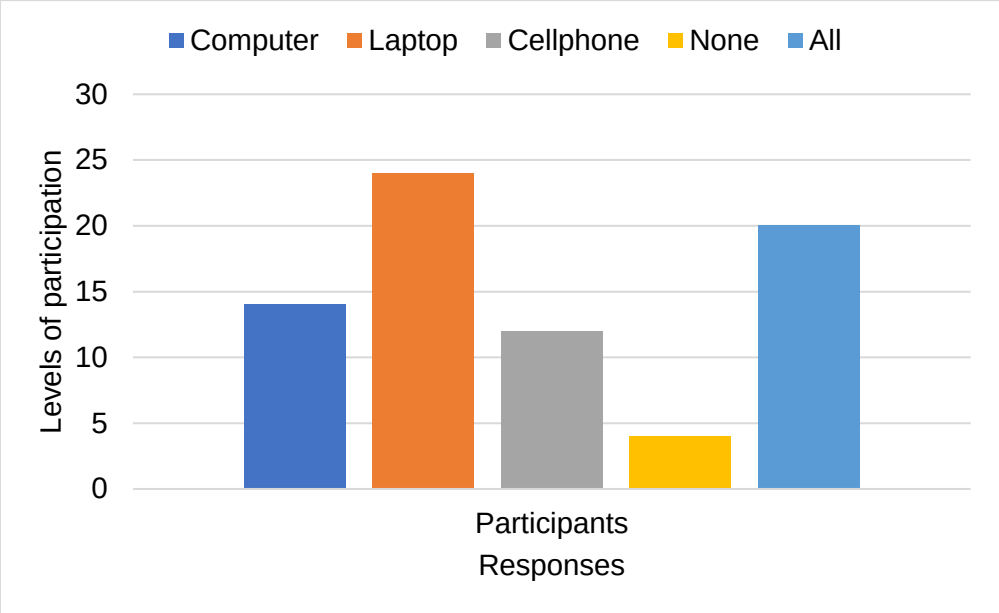


Figure 4.8: The preference of participants in terms of accessing information and learning materials between computers, laptops and cellphones.

As illustrated in **Figure 4.8**, the preference of participants in terms of accessing information and learning materials between computers, laptops and cellphones is summarised**.** Specifically, out of the 50 respondents, 14 of participants confirmed that they use computers to access information, 24 used laptops, and 12 cellphones, which translates to 19%, 33%, and 16% respectively, while 27% makes use of all the tools and only 5% does not use any of the ICT tools to access learning materials. This is due to the access to the computers used for administrative purposes in the schools, as there was mention of the computers in the labs not being connected to the internet. However, the DBE has supplied laptops to some teachers and modems. When it comes to cellphones, everyone has a smartphone that can access the internet should they have data. Mostly use both cellphones and laptops hence the high percentage in those numbers. This can

serve an avenue to enhance e-Learning in rural area and this could achieve through an in-depth feasibility study.

4.4.1.1 Computers

Respondents mentioned using computers to access learning materials as one method and method and it is an international norm (Aldiab et al., 2017). This is most likely respondents who agreed that their schools have computer labs; however, due to the conditions of the lab, it is highly unlikely that the materials are accessed through the computers in the lab, but rather through the computers in the offices that are used for administrative purposes. In cases where there are computer labs, they are not enough to accommodate all learners; additionally, the computers are outdated, and the lab itself is in poor condition, resulting in the lab being underutilised. Furthermore, teachers would be limited to using such time for computer literacy skills rather than using computers for teaching curriculum related content.

4.4.1.2 Laptops

Respondents who received laptops from the Department of Basic Education (DBE) mention that using them for lesson preparation and personal assignments. Some people use such laptops to access learning materials, prepare question papers, conduct research for their lessons, and even access hard-to-find textbooks, and this could be deemed a beneficial use. There were no respondents who mentioned using such laptops in the classroom to project a lesson or demonstrate something to learners and that is an avenue that lacks exploitation.

4.4.1.3 Cellphones

Congruent to the 4IR, everyone relies on the phone for communication and other essential things such as surfing the net. Specifically, most people own cellphones, and they have stated that they only use them to access learning materials at times. The question was designed to determine whether people consider a cellphone to be a tool for accessing materials or for learning activities.

4.5 Preparedness to integrate ICT system into teaching and learning

4.5.1 Level of teachers' preparedness to integrate ICTs into teaching and learning

This section deals with the level of teacher preparedness to integrate ICTs into teaching and learning activities is illustrated in Figure **4.9**

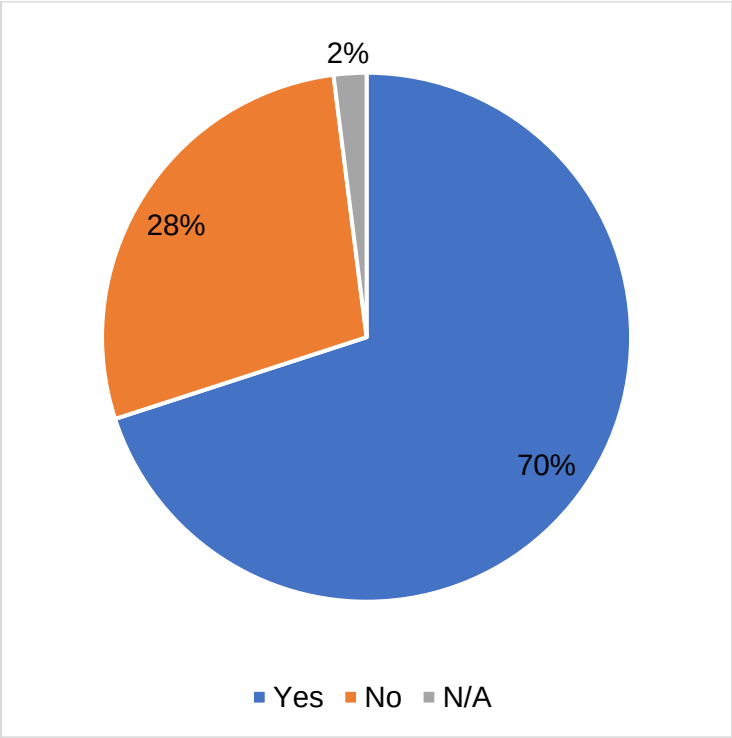


Figure 4.9: The level of teachers' preparedness to integrate ICTs into teaching and learning activities.

As illustrated in **Figure 4.9,** of the 50 respondents, 35 agreed that they have the skills for online teaching, while 14 said they did not have the relevant skills for teaching online. This translates to 70% agreeing to have the necessary skills while 28% disagreeing. However, when asked if they require training they said "yes". This gives an impression that they are referring to basic computer skills rather than the skills and understanding of what eLearning entails and the use of learning management systems, hardware's (servers), and technical support. Perhaps they also replied "yes" due to their ability to surf the internet for relevant materials. As such training is required to fulfill this component of e-Learning.

4.5.2 Access to a laptop as provided by the DBE

A summary of the percentage of teachers who have received laptops from the DBE is shown in **Figure 4.10**.

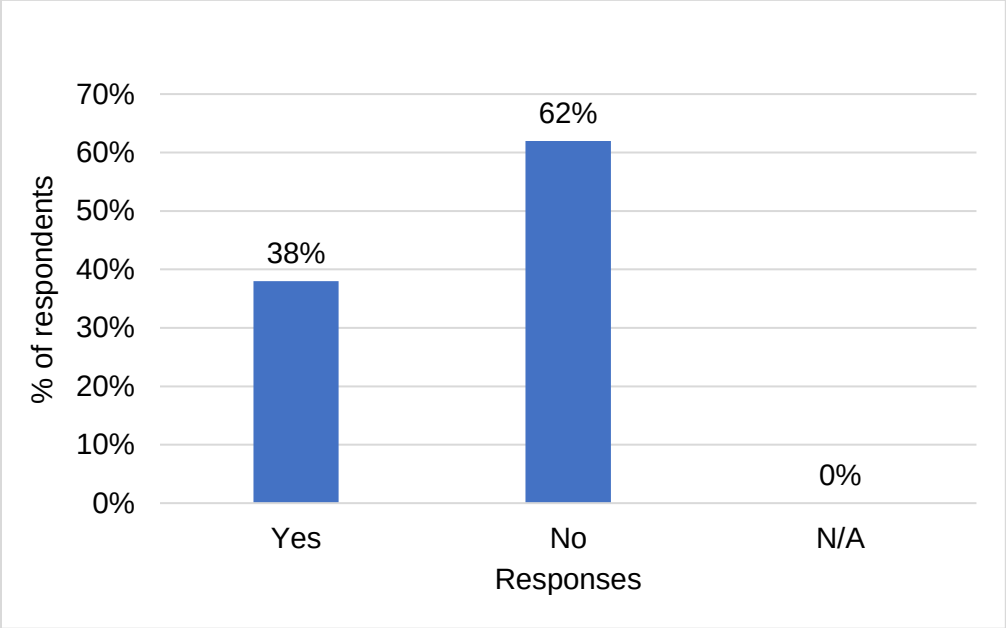


Figure 4.10: A summary of the percentage of teachers who have received laptops from the DBE.

The DBE had an initiative where they sought to provide teachers with laptops as part of the ICT integration process and ensuring that schools possess a laptop or a computer and this has been proven effective in other countries (Taucean and Tamasila, 2014, Can, 2015, Hubackova, 2015, Aldiab et al., 2017). As illustrated in **Figure 4.10,** out of the 50 respondents, about 31 said they did not have laptops provided by the DBE, while 19 said that they had laptops provided by the DBE. Translating into 62% percent having access to a laptop provided by DBE and 38% not having access. When asked what they use the laptops for, the majority of them said they use them to access textbooks because there aren't enough of them, they also use them to write and prepare lesson plans, set question papers, and store and save information. They also mentioned using the laptops for their school assignments. It should be noted that some of the people who do not have laptops included the teacher assistants.

4.5.3 Preference between traditional classroom methods and e-Learning

The preference of educators in terms of the use of e-Learning or classroom methods are shown **Figure 4.11.**

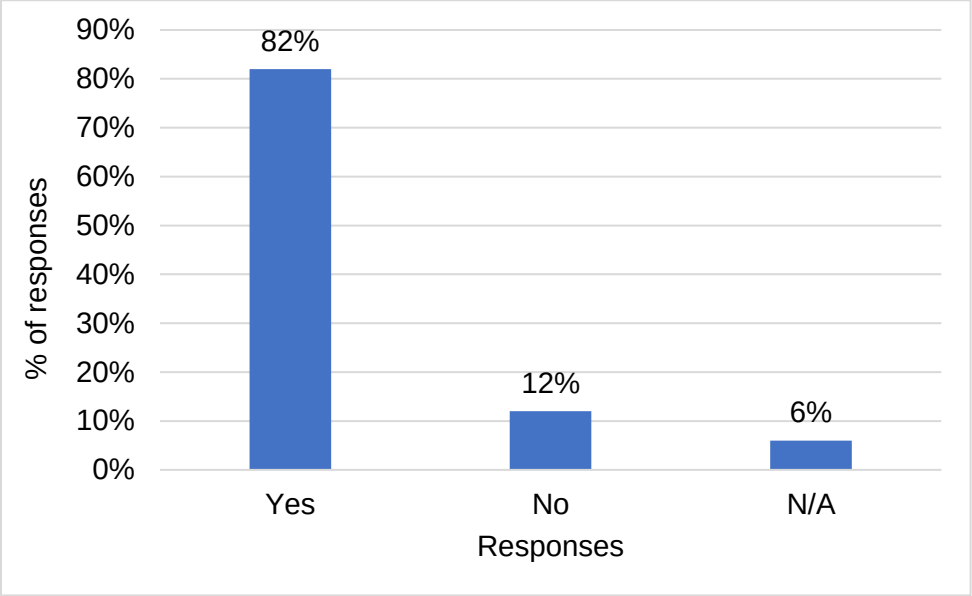


Figure 4. 11: The preference of educators in terms of the use of e-Learning or classroom methods.

E-learning enables educators to reach a wider audience and deliver a more consistent message to their learners. With this learning mode, all learners receive the same type of training and information at the same time. However, despite the popularity of e-Learning, most people intentionally stay away from such methods. In preference to traditional classroom as stated by most of the respondents who took part in the study. As illustrated in **Figure 4.11**, out of the 50 respondents, 41 said that they prefer traditional classroom method, while 6 said they preferred online methods and about 3 chose N/A. This translates to 82% preference of traditional methods, 12% of online methods and 6% who was undecided and as a result chose N/A. I believe that traditional methods are preferred because they allow physical interaction and the fact that these schools do not have the connectivity, infrastructure, and enough computers to conduct lessons online. Also, resistivity could be a challenge since teachers have fear of a new system of learning.

4.6 Needs and support for effective implementation of e-Learning

The needs and support that are required for effective implementation of e-Learning at LMICs and further afield is shown in **Figure 4.12**

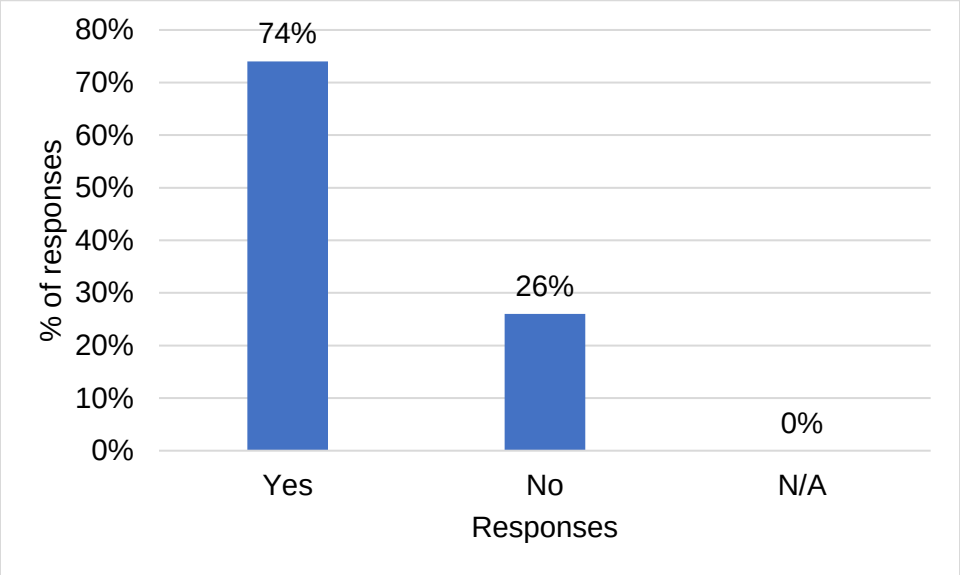


Figure 4.12: The needs and support that are required for effective implementation of e-Learning at LMICs and further afield.

Teachers must understand how online platforms work, how to create teaching material, generate online assessments, and assess online in order to integrate or switch from the conventional classroom to e-Learning (Copeland et al., 2014, Hubackova, 2014, 2015, Aldiab et al., 2017). The DBE needs to provide support for teachers to effectively integrate ICTs into teaching in the form of skills. As shown in **Figure 4.12**, out of the 50 respondents around 37 of the respondents mentioned that they require training while 13 said they do not require training. This translates into 74% percent of them use agreeing that they require training to be able to use and manage ICTs while 26% said they do not require training as they are already acquainted with the application of ICTs and they are also computer literate, which they equate to the required skill. This is one of the components that need to be considered to successfully roll out ICT in LMICs schools. Education starts with the teachers and they require capacitation to fully roll out e-Learning.

For some who agreed to need training, they mentioned the need for ongoing training to be able to understand the benefits of digital literacy which would motivate for them adopting this technique or modality of teaching. Moreover, the ever-changing environment of technology necessitates upskilling as technologies change for teachers to be always up-to-date with technological advances. Moreover, training is needed to capacitate teachers to teach effectively using computers and be able to access materials and generate assessments. However, to empower or upskill teachers does not necessarily mean readiness for e-Learning as other factors such as availability of infrastructure and ICT tools needs to be considered.

Moreover, they require the government to be at the forefront of such initiatives through the provision of necessary facilities such as computers, classrooms that are fitted with projectors, smart screens/boards, and overall re-modeling of classrooms to ensure that they are ICT compatible and are connected to stable internet. They also argue that government should provide iPads or tablets to all learners and not just Grade 12 learners and ensure that such gadgets are restricted or tracked to ensure that they are only accessing educational materials. There is also a need for the government to supply 100% support in form of computers to ensure that there are functional labs at the schools that can accommodate all learners. This can be done by learner computer ratio, and this can make up for the iPad supply shortfall.

4.7 Knowledge about e-Education Policy and implementation frameworks

Based on our cross-cutting survey, most respondents were unfamiliar with the e-Education policy, which is concerning because they cannot implement a policy that they are unfamiliar with nor understand. This gives the impression that the policy is not being implemented because teachers are unaware the significance of incorporating ICTs into teaching and learning activities or the public participation process was not embraced to raise public awareness. Those who are aware of the policy see it as a guideline for the implementation of e-Education, as well as education guided by policy and the government's desire to use technology in learning activities. None of the teachers mentioned the ICT teacher development framework, which was developed to implement

the recommendations in the White Paper on e-Education. The guidelines outline the required ICT knowledge, skills, values, and attitude necessary to integrate ICTs into teaching and learning, as well as the various support roles. Moreover, professional development framework for digital learning was not referenced. This framework was supposed to ensure that teachers are capable and proficient use ICTs systems and to upgrade educational activities. This has failed since the end-users are not cognizant of the tool that should be instrumental in the deployment and implementation of e-Learning.

There is also the guideline for managing ICTs in South African Schools, which was also not cited by the respondents, this guide is specifically for Principals with the aim of providing the Principals with knowledge on how to manage ICT resources, even though there was reference on Principals being trained to manage ICTs. Based on the acquired perspectives and gathered data, it can be concluded that teachers are not aware of these frameworks, and perhaps this is the reason why ICTs are not integrated or partially used in some schools. These frameworks can empower teachers and provide guidance in terms of ICT incorporation which in turn, increases the chances of successful integration.

4.8 Summary

The chapter was significant since it diagrammatically showed the research findings, as demographics were crucial in showcasing the engagement of male and female teachers, as this would reflect their reception to eLearning. The graphs are supported by discussions and further elaboration on the responses. The data in the discussion highlights the availability of ICT tools, infrastructure, connectivity, skills and preferences between traditional and eLearning methods, the required support to implement the e-Education policy. Other information offered includes the types of ICT tools used, teacher skills as they relate to eLearning, and their preferred approaches.

The study sought to determine the factors that hinder e-Education implementation in the Manyeleti Education Circuit. The findings show that teachers are familiar with the concept of eLearning; however, most teachers are not using any of the ICT tools listed in the study for the purpose of teaching, nor are they using computer labs due to a lack of computers and connectivity, both of which are critical to eLearning. Furthermore, even though the

majority preferred traditional methods, the majority responded that they require training to conduct eLearning.

The data revealed the problems hindering the implementation of the e-Education program and emphasised the need for government support to integrate ICTs into school activities. This highlighted the terms outlined in the theoretical framework as it relates to the ICT tools that they have access to, which ones are used in schools, appropriation which is the stage at which teachers can use and holistically understand them and integrating them into daily teaching and learning activities. Finally, teachers should be imaginative to establish new knowledge and learning environments that encourage and support the use of ICTs.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This chapter summarises the research considering the conclusions presented in the previous chapter. There will be recommendations at the end of the chapter that can be used to resolve the problem of the study. The developed objectives and hypothesis, which were met by the study were as follows:

- To determine the challenges that hinder the integration of ICT system into teaching and learning within schools in the Manyeleti Education Circuit, Hluvukani region, Mpumalanga, South Africa.
- To determine the extent to which availability of ICT systems could have fostered alternative learning methods during COVID-19 and further afield.
- To determine the degree and extent of teachers' preparedness to successfully integrate ICT system into teaching and learning.
- To highlight the needs and the required support for e-Learning to be effectively implemented and rolled out.
- To develop viable modalities, recommendations, and suggestions on how e-Learning could effectively be implemented.

H1: Lack of ICT systems and capable teachers hinders the integration of ICT systems into teaching and learning.

To achieve the study's objectives an extensive review and analysis of literature about e-Learning, its benefits, challenges, teacher attitudes and preparedness, the skills challenge among teachers, the policy environment and the theoretical and conceptual frameworks was carried out. It is evident from the reviewed literature that there is no consensus on the definition of e-Learning but there is consensus that this form of learning takes place online. The South African context aligns more with the communications

definition which views e-Education being about connectivity to the internet, information, teachers and other learners using technology. This is also seen as one of the benefits of e-Learning which includes having access to a variety of information sources and being able to learn remotely.

There are policies in place set by governments to ensure the incorporation of e-Learning into schools, in South Africa we have the *White Paper on e-Education,* which advocates for ICT integration in educational activities, however, it is not without challenges as policy implementation in S.A is often met with challenges. Thus, this policy, in particular, is met with challenges such as, lack of skills, technology for e-Learning, connectivity and ICT infrastructure. To address the skills challenges, it is crucial to look at teacher development programmes and guidelines for implementing e-Learning.

It is worth noting that these challenges are not confined to S.A, as evidenced in the literature review that many countries face similar challenges with an exception of a few who have advanced. For example, in Italy similar challenges that were faced in S.A during COVID-19 were also faced, difficulties like limited access to computers. Participants in the schools under study faces the same challenge with regards to not having access to computers. This is due to dilapidated computer labs with 15 to 25 computers per lab, with out-of-date computers that cannot cater for all learners, resulting in the labs not being used due to the learner computer ratio. Furthermore, the labs are not connected to the internet; those who access material do so through cellphones, personal laptops, and DBE-provided laptops.

They also use the DBE-provided laptops to complete personal assignments, search textbooks, plan lessons, and set questions papers. Access to ICT tools, a stable internet connection, and ICT tools would have provided alternative learning solutions for Manyeleti Circuit learners during the hard lock down resulting from COVID-19, as it did for other learners around the world, as shown in the literature. It did, however, result in learners being excluded from learning activities and widening the digital divide. The government must provide the necessary tools and infrastructure for e-Learning, as well as train teachers to effectively teach online. Because all these factors are interdependent, the

availability of tools or availability of skills in the absence of internet connectivity cannot ensure e-Learning. It requires teachers with the necessary skills, the availability of ICT tools, the proper infrastructure, connectivity, and learners with basic computer skills. This was one of the conclusions drawn from the data gathered from the fifty participants who had been purposefully chosen. The data was gathered via questionnaires, online surveys, observations and interviews. The study used a case study approach and a combination of data collection and analysis techniques.

The theoretical framework of the research was founded on developmental theory because the e-Education policy sees ICT integration as a way to narrow the digital gap and enable learners to participate in the information society or knowledge economy while also developing their skills. It also considers teacher development as an essential component of ICT integration, as well as looking at issues of accessibility, whether there is access to ICT resources, and whether teachers can adopt and adapt to them in the classroom.

To successfully integrate; ICTs into learning and teaching or switch from traditional methods to e-Learning or online learning, support is required at all levels, including national, local, and district levels. These levels must work with the private sector to meet the financial demands of e-Learning, which necessitates learning tools, infrastructure, connectivity, maintenance of the tools, software, and hardware, as well as maintenance of such tools. The issue of teacher professional development, particularly providing teachers with guidance regarding the proper utilization of technology in the classroom, how to integrate it into the pedagogy for instruction, and how to access and choose resources, plays a crucial role in the successful implementation of e-Learning. To ensure that nobody is left behind, they will also require support groups where members can help one another through difficulties and talk about strategies that work better. Finally, the study confirmed the hypothesis of this study which highlighted that the lack of ICT system and capable teachers hinders the integration of ICT systems into educational activities.

5.2 Recommendations

Based on the findings acquired from this study, the following recommendations are made:

- Training of the teachers and support staff on how to incorporate the ICT system in the classroom.
- Migration to a hybrid teaching system and model that allows for both physical and virtual teaching. This will also make provision for recap for learners.
- Procurement of relevant and up-to-date ICT systems for the schools and this should be aligned to levels in terms of grades.
- Refinement of the existing ICT systems in line with the amended policy for e-Learning.
- Migration to centralized web-based learning system including online assessment systems and recording of teaching notes for offline reading and preparations.
- Have more than 1 computer lab per school with computers based on the ratio of learners.
- Introduction of projectors for lessons to be projected in class and this will enable higher accessibility and legibility.
- Government should look for a way for learners to have email accounts, where materials will be shared online and quizzes would be generated. To access the emails, they could use the computer labs if they are well equipped or alternatively, their tablets or cellphones.

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APPENDIX

Appendix A: Questionnaire

My name is Anita Mnisi, I am a Master of Management student in the field of Public Policy at the Wits School of Governance, Johannesburg. As part of my studies, I must undertake a research project. I am investigating the factors that hinder the implementation and effectiveness of the e-Education policy in the Manyeleti circuit, specifically the schools in Hluvukani Village under the supervision of Professor Pundy Pillay. As part of this project, I would like to invite you to answer this questionnaire. This activity will involve 16 questions and take around 10 to 15 minutes to complete.

The information shared will be completely confidential, voluntary, and anonymous as I will not be asking for your name or any identifying information. The information you share will be held securely and not disclosed to anyone else. Permission to conduct the research has already been obtained from Mpumalanga Department of Education and the Manyeleti Education Circuit.

Section A: Demographic information

Gender: …… Occupation: ……

Section B: General questions on e-Learning

	Question	Yes	No	Comments
1.	Have you heard about e-Learning?			
2.	Do you have a computer lab in your school?			
3.	Do you use the computers or the lab for learning activities?			
4.	Do you prefer traditional method (face-face with a teacher in the classroom, using the chalkboard and textbook) or learning/teaching via online platforms?			
5.	Do you have the skills for online teaching?			
6.	Is your school connected to the internet?			

What kind of ICT tools do you use to access learning materials in your school?

☐ Computer

☐ Laptop

☐ Cellphone

☐ None

What do you understand by e-Learning learning?

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……

Do you use any technology in learning activities in your school? If yes or no, please explain

……
……

Do you have the right infrastructure for online-learning? Please explain

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……

Do you have a laptop provided by the DBE? If yes, please explain how you use it

……
……

SECTION C: This section looks at the challenges and required support for e-Learning

ICT resources refers to: Computers, laptops, tablets, cellphone, software and apps to enable online learning.

What do you understand about the e-education policy?

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What are the challenges that you think make it difficult to use ICTs in the classroom?

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How did these challenges affect learning and teaching during the Covid-19 pandemic?

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What support do you require to from the government or district to use ICT in the classroom?

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Do you need training to use ICTs for teaching in your classroom?

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