



**Teacher's experiences of technology as a developer of inclusive education  
in primary schools of Namibia**

**by**

**ZELDA ALMA VAN WYK**

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## **FOREWORD**

I dedicate this dissertation to my family, my husband, Arno and two children, Arzel, and Armando, who have always believed in me and shared in my dreams.

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## **ABSTRACT**

*“All children can learn, if we can learn how to teach them”* - Sister Joanne Marie Kliebhan

The combination of technology and inclusive education practices are two new phenomena in the education sector. As a teacher in the 21<sup>st</sup> century, one must be better equipped to cope with new challenges. The learning environment has changed, and weaker children or children with learning disabilities have become part of the system. More diversity in classrooms provides possibilities for unique relationships and equality. Technology can improve and transform teaching in a way that will benefit weaker children specifically.

In this research study, I attempted to determine what kind of experiences primary school teachers in Namibia have about technology and inclusive education. This research study also examined the teachers' perceptions when technology was used as a pedagogical tool in the classroom, the challenges when technology was used in the learning environment to develop inclusive education, and how these two phenomena complemented each other. This study therefore focused on teachers' experiences, technology, and inclusive education.

Semi-structured interviews were conducted to clarify the teachers' experiences about technology and inclusive education. In addition, participant classroom observations were conducted to see and hear how teachers used technology to assist learners in an inclusive classroom as well as the challenges they faced when technology was used.

The study built a case for technology as a developer of inclusive education in primary schools of Namibia. Results showed that technology significantly complemented inclusive education.

Keywords: teachers' experiences, technology, inclusive education, Namibia

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# 1. CHAPTER: PROBLEM DEFINITION AND ORIENTATION

## 1.1 Introduction

Worldwide education in the 21<sup>st</sup> century is a topic of great interest. Wearmouth (2009:212) refers to education as the unleashing of students' minds as learners and as members of the broader community. It is inevitable that every teacher at some point will encounter learners in their classrooms that face obstacles with regard to learning. It seems, however, to be a global trend for children with disabilities (more than any other group of potential learners) not to enter the formal school system at all or to leave school without completing their primary or secondary education (UIS, 2017; UNESCO, 2009).

Although Namibia has made some progress towards achieving its goals for providing education for all, as established by the UNCRPD, and while the *Sector Policy on Inclusive Education* ("the Sector Policy") has been implemented, progress in putting the inclusive education principles into practice has been lagging. Consequently, the many needs of children with disabilities and the barriers they face in accessing and remaining in education in Namibia have not yet been sufficiently addressed (UNICEF, 2016).

The combination of technology and inclusive education is comparatively new in the Namibian education sector. Technology is a major promoter of transformation and can have a tremendous influence on existing culture. Effective use of technology can also provide teachers the means to meet individual needs, address barriers to learning in the modern classroom, and help learners to deal with ongoing technological change in society and the workplace.

Globally, inclusive education practices are being developed to ensure that all learners (i.e. those with and without disabilities) are provided equal opportunities to receive education (Breiling, 2017). The main benefits of inclusive education for learners are tolerance for disabilities, and a reduction of fear and rejection. Additionally, it creates potential for these learners to develop unique relationships and to gain equality in their society (Chowdhury, 2011:4). "*If a child can't learn the way we teach, maybe we should teach the way they learn*". In so doing, learners

will be provided an equal chance to succeed in school and no child will be left behind. All these efforts are intended to serve young learners better and to create the optimal environment with sufficient opportunities for all children to grow and develop (Brewer, 2014: 82).

Evidence in this research show that it may be challenging and demanding to find ways to address the learning needs of all learners. However, it may also be exciting and very rewarding at times. During the time I spent as a learning support teacher at schools, I observed the tendency of students to leave school at a very early age due to learning difficulties and disabilities or the inability of the education provider to recognise and address their specific and varied learning needs. I became interested in exploring the use of technology as a facilitator of inclusivity. The development of inclusivity in the school environment also stood out as a core aspect for me.

Chapter 1 presents a basic orientation for this research study by providing an explanation of concepts (cf. 1.2); background to the problem statement (cf. 1.3); research problem (cf. 1.4); research questions (cf. 1.5); objectives of the study (cf. 1.6); literature study (cf. 1.7); research design (cf. 1.8) summarises and explains the chapters in this research study (cf. 1.9).

## **1.2 Explanation of concepts**

The key concepts, namely teachers' experiences, technology, and inclusive education, are identified and briefly described to provide some insight into the subject of the study.

### **1.2.1 Teachers' experiences**

*"If we teach today as we taught yesterday, we rob our children of tomorrow."*

– Chinese Proverb

Teaching is very challenging because it entails dealing with human beings who receive information in different ways according to different backgrounds and experiences.

The Oxford Dictionary (2001: 311) defines experience as “practical contact with and observation of facts or events, knowledge or skill gained over time”.

Evidence in the literature shows that teachers need to change their teaching methods to adapt to the diversity of their learners in the classroom. Teachers' knowledge of technology is a valuable tool in teaching and learning. Regrettably, this knowledge is often limited. Therefore, it could be difficult for teachers to adapt or change their teaching practices to meet each learner's unique needs and learning style. Howard, (1983) proposed the Theory of Multiple Intelligences. This theory assists teachers to use different ways to teach more effectively by developing learners' strong points to help them to learn better. As a number of researchers have observed, there is immense potential for computer-assisted learning to reduce obstacles to cognitive, affective, and physical learning (Wearmouth, 2009:183). Jean Piaget and Lev Vygotsky are considered two of the most influential cognitive developmental theorists of all time. Their theories have significant implications for teachers in terms of active learning and assisted learning in the inclusive classroom.

In spite of digital information and communication technology (ICT) playing an important role in most Africans' daily lives, it still seems to be an unfamiliar phenomenon in the general school environment in Namibia with implementation lagging considerably behind. It is crucial that ICT is incorporated in all classroom teaching and learning. Many schools in Namibia have started to recognise the true potential and value of this tool to support the instruction of learners at all levels of education. Therefore, we need to develop human and instructional resources to fulfil the diverse learning needs of all learners. We must find creative ways to adapt and use the system to our advantage. Using old techniques is like sawing a tree with a bread knife – it is possible, but there are more efficient ways (Hugo, 2014: 218).

Providing a more abundant environment, will encourage many more connections between the neurons of the brain, creating more possibilities for solving problems (Brewer: 2014). As teachers, we cannot shy away from the reality that we are living in an era where technology is the heartbeat of our modern-day, diverse societies. To be successful as a teacher, one will have to incorporate those strategies which best allow access to the curriculum, and into classroom teaching. It will also be necessary to develop methods to accommodate all learners' needs and individual

learning styles. For the purpose of this research study, the focus was placed on teachers' experience with technology as a pedagogical tool in the classroom.

### **1.2.2 Technology**

The main role of technology is not so much to control learning but to support it. Januszewski and Molenda (2010) explain that educational technology entails the study and ethical practice of facilitating learning. It also involves the improvement of performance through the creation, use, and management of applicable technological processes and resources.

Technology has transformed our lives immensely over the past few years, and it is essential that we employ technological advances in our approach to our children's education (Hugo, 2014:217). It is not about *what* we teach, but rather about *how* we teach. According to Wearmouth (2009), one useful approach is to conceptualise applications of ICT in tutoring, exploration, a tool, communication, assessment, and management. Technology can help to transform classroom instruction from the classic practice, which is focused on the teacher, to one which focuses on the student instead. This will allow learners to play a more active role in their learning. It is important that children have opportunities to make choices in the learning environment. Technology provides tools that can help children to gain more independence to complete their work in the classroom. It can also help to personalise learning and to help learners feel more successful at school.

Assistive technology (AT) has different options that can be applied in the teaching of children with learning disabilities or learning problems. The Government Gazette of the Republic of Namibia (2020: 6) defines assistive technology as "any device, piece of equipment or instrument used to increase, maintain or improve the functional capabilities of individuals with disabilities." These include visual aids, walking sticks, wheelchairs, Braille, video magnifiers, screen readers, augmentative communication devices, and specialised equipment for computer access which a learner with special education requirements may need to access, and benefit from education.

Various high-tech and low-tech options are available. High-tech options include apps or devices, for example dictation software, laptops, computers, iPads, and typing programs. Low-tech options are, for example, specific pencil grips, slant boards to make writing easier, or placing a heavy-duty rubber band around chair legs to address attention issues. The benefits of technology and the way it complements inclusive education, the usefulness of assistive technology in the instruction of children with wide-ranging educational needs are undeniable.

Technology is further valuable to teaching and learning as it can be used purposefully to design developmentally appropriate solutions for learners' diverse problems and to organise their everyday learning experiences.

### **1.2.3 Inclusive education**

Namibia has a legislative environment which is conducive to inclusive education. According to the 2011 Namibia Population and Housing Census (NPHC), 3,3% of children between the ages of 6 and 19 have some form of disability. This means that more than 21000 children have disabilities. The NPHC (2011) established that only 65% of these children were attending school, compared to 79% of children without disabilities who attended school. This comparison suggests that another approximately 5000 children were not attending school due to disability. It is, however, important to note that Namibia, as a developing country, does not have updated statistics regarding children with disabilities (Assessing Inclusive Education in Practice in Namibia, 2018).

The Sector Policy on Inclusive Education has been in effect in Namibia since 2014 when it was implemented by the Ministry of Education, Arts and Culture (MoEAC). This policy promotes an education system which is accessible, inclusive, equitable, efficient, and of good quality. The policy also specifically focuses on those who are vulnerable and have special needs and disabilities, to ensure that all children are able to participate in and benefit from quality education.

Today, children with special needs are much more likely to enrol in mainstream schools than they were in the past. The drive to ensure that children with disabilities were included in all areas of society started in the developed countries in the 1970s

(Bayat, 2014). Since then, various governments globally have accepted the challenge to develop incorporate inclusive education approaches (Breiling, 2017:1).

The following definition, from the Salamanca statement, is one of the most referred to definitions of inclusive education in research:

*“The guiding principle that informs this framework is that schools should accommodate all children, regardless of their physical, intellectual, social, emotional, linguistic, or other conditions. This should include disabled and gifted children, street and working children, from remote or nomadic populations, children from linguistic, ethnic, or cultural minorities and children from other disadvantaged or marginalized areas or groups”* (UNESCO, 1994:6).

The Government Gazette of the Republic of Namibia (2020:8) defines inclusive education as a process of –

- (a) addressing and responding to the diversity of needs of all children and adults through increased participation in learning, cultural activities, and communities.
- (b) reducing and eliminating exclusion from the education system; and
- (c) involving changes and modification in content, approaches, structures, and strategies, through a common vision which includes all children of the appropriate age range and a conviction that it is the responsibility of the regular system to educate all children, irrespective of ability, disability, economic or social status.”

Inclusive education is understood to perfectly support the rights of children with special needs. For this reason, it is a commonly-implemented approach worldwide (Breiling, 2017:4). The intention is to ensure the right of all children to participate in mainstream schools and to be educated with their peers. However, while inclusion is considered a desired state worldwide, various obstacles to successful inclusion still exist (Breiling 2017:21).

Namibia's *Sector Policy on Inclusive Education* (2013) promotes the right of all children to quality education, irrespective of their circumstances. Furthermore, the Fifth National Development Plan, the Child Care and Protection Act, 2015 (Act No. 3 of 2015) and Goal 4 of the UN Sustainable Development Goals, support the right of all Namibian children to quality basic education. In particular, children with disabilities and those who have special educational needs rely on the recognition and fulfilment of this right.

There have been many attempts to develop inclusive education. Children who tend to struggle more than others also need to be taught in different ways to give them an opportunity to use different methods to show what they know. Typically, these children will need assistive technology (AT) after an individual education programme (IEP) evaluation has been considered by an IEP team, with options that will work best for the child's specific needs. In this way, these children will have an equal chance to succeed in school. Research by (Hasselbring T. S. and Glaser, 2000) shows that students who have academic problems often have a special ability with computers.

### **1.3 Background to the study**

The essence of education is to teach learners from different backgrounds and experiences to reach their full potential. All children can benefit from schools that develop and apply methods of teaching that address individual differences while educating children together. Inclusive education as a social concern is justified as educating all children together helps to change society's perception of and attitude towards diversity. This, in turn, has a positive, cumulative effect by developing a fair and unbiased society (*Assessing Inclusive Education in Practice in Namibia*, 2018).

The different needs of learners should be emphasised. In addition, the fact that each learner is unique with his or her own intelligence superiorities and weaknesses should be taken into account. The Government Gazette of the Republic of Namibia (2020:8) describes inclusive education as a process to reduce and eliminate exclusion from the education system. This requires schools to develop interactive teaching methods to make provision for all learners. A further requirement is to ensure that all learners benefit, irrespective of any physical, learning or other

disability, social status, or gender. Wearmouth (2009) pointed out that a clear understanding is required to embed the use of unfamiliar technology in the curriculum to ensure the effective use of ICT in the classroom for and by students with special education needs.

Brewer (2014) highlighted the potential of technology to bring about positive change in teaching through insightful software selection and its imaginative use to teach children. As a pedagogical tool, technology is often neglected or ignored because teachers have the perception that learners are already spending too much time on technology in their daily lives. Teachers need to constantly master evolving technology and digital learning tools to serve learners better. The internet has permanently changed people's potential. Everyone who has access to the internet has an equal opportunity to an excellent education. Not only is the internet informative, it also gives children in Third World countries insight into how modern society operates and vice versa (Hugo, 2014: 218). Teachers need to use technology to support learners' development of knowledge and skills and in solving problems to extend human capabilities to help learners to overcome barriers to improve their opportunities. This will result in every child feeling successful at school and no child being left behind. As teachers, we must remember that the more we know about our learners, the more we can help them to improve their quality of life. Technology is one of the tools that can be used to transform the education sector into a more equalised environment for society. This demonstrates a need to examine teachers' experiences in using technology as a tool in a diverse classroom to meet learner's unique needs and learning styles in order to help each individual to reach their potential.

Consequently, this research study examined teachers' experiences in using technology as a developer of inclusive education in primary schools in Namibia.

#### **1.4 Statement of the problem**

Namibia regards her children, especially those from vulnerable and marginalised communities, as immensely valuable. The following statement by the Government

of Namibia upholds the importance of inclusive strategies that are required to address the obstacles faced by marginal communities and learners with special needs. It is also provided to affirm the need for the current study.

***“Education should be valued as a key social investment and a means to reduce inequality. ... Inclusive strategies are needed to respond to marginal communities and students with special needs. Education legislation is committed to making education a right and making explicit the link between education and improving human capital and economic development.” – Namibia’s National Agenda for Children 2012-2016*** (Government of the Republic of Namibia 2011): Commitment 2 – on equal access to quality integrated education.)

By examining teachers' experiences in the use of technology as a developer of inclusive education, future teachers can be encouraged to create inclusive opportunities for learners to learn and show their potential through specific teaching methods that accommodate their unique learning styles. Technology is a means to advance and revolutionise teaching for weaker learners in particular. Learners from rural and urban areas, who only have access to technology at their schools, will also benefit immensely. The use of technology will ensure that children with disabilities, and those with other special educational needs, will have equal opportunities and equal access to education. It is important to investigate the challenges faced by teachers in using technology in the learning environment to develop inclusive education. Furthermore, the perceptions of teachers about technology and inclusive education play an important role in determining the value of technology as a pedagogical tool in the classroom to develop the education sector into a more equalised environment for its society. This is necessary to highlight the importance of primary school teachers as role models in using technology to develop and complement inclusive education.

Therefore, the research study aims to investigate teachers' experiences of technology as a developer of inclusive education in primary schools in Namibia. The following research questions were formulated to address this research problem.

## **1.5 Research questions**

The primary research question was:

- How does the use of technology develop inclusive education in primary schools in Namibia?

The following secondary questions arise from the primary question:

- What perceptions do teachers have about technology and inclusive education?
- How do teachers perceive technology as a pedagogical tool in the classroom?
- What are the challenges of using technology in the learning environment to develop inclusive education?
- How do technology and inclusive education complement each other?

## **1.6 Aim and objectives**

The primary aim of the study was to explore technology as a developer of inclusive education.

The aim was achieved through the following objectives:

- investigating teachers' perceptions regarding technology and inclusive education.
- determining how teachers experience technology as a pedagogical tool in the classroom.
- understanding the challenges of using technology as a developer of inclusive education in the learning environment; and
- exploring how these two phenomena complement each other.

The following section presents a summary and explanation of the research design used in this research study.

## **1.7 Literature review**

The literature study consists of a comprehensive study of the literature available on teachers' experiences, technology, and inclusive education, as well as the theories of two of the foremost theorists, Lev Vygotsky, and Jean Piaget. The literature study was undertaken to analyse technology and inclusive education as phenomena in the classroom and to determine what experiences teachers have regarding technology as a developer of inclusive education.

A literature search was done using the following keywords: modern interactive classrooms, technology, assistive technology, inclusive education, inclusive classrooms, generated a variety of articles, textbooks, magazines, and internet search engines. This indicated that there were enough sources available to carry out an effective literature study. In chapter 2 of this research study, a further explanation will be given of the literature reviewed.

## **1.8 Research design**

A qualitative approach was applied in the research for this study and a multiple case study design was followed. The chosen research design will be explained in more detail in chapter 3. The methodology, paradigm, selection of participants, the instruments and data collection techniques, and the data analysis and interpretation will also be discussed.

### **1.8.1 Research methodology**

The term *methodology* serves merely as a strategic but malleable guide throughout the research (Nieuwenhuis, 2016b:74). The methodology of this study was qualitative and followed a multiple case study. McMillan and Schumacher (2010:344) describe a case study as an “in-depth analysis of a single entity”. In addition, they refer to a case study as an “in-depth exploration of a bounded system (e.g., an activity, event, process, or individuals) based on extensive data collection”. It is important to understand personal experiences for this study. For this reason, that qualitative methods were found to be most appropriate for data collection and analysis. The aim of qualitative research is to create understanding of the socially

constructed world (Breiling, 2017). It is therefore especially suitable when an comprehensive understanding of individuals' own experiences, past development, impressions, and opinions is required (Breiling, 2017). The use of a case study is accepted practice in education research. This was also the case in this study, as the researcher aimed to collect data from persons who have experienced the phenomenon of using technology to develop inclusive education. The research methodology is further explored in chapter 3.

### **1.8.2 Research paradigm**

The research paradigm of the study complements interpretivism because this kind of research is aimed at offering a perspective on and enable analysis of the situation under examination to gain understanding of the way in which a particular group of people makes sense of their circumstances or the phenomena they encounter (Nieuwenhuis, 2016b:62). According to Nieuwenhuis (2016a:62), one can conclude that the interpretivist perspective is based on the assumptions that human life can only be understood from within, and the human mind is the purposive source or origin of meaning. Interpretivism applies to the research question, as it is possible to develop an understanding of the meanings that people ascribe to phenomena within their social framework (Nieuwenhuis, 2016a:61). The research paradigm is explained in more detail in chapter 3.

### **1.8.3 Population and sampling**

Purposive sampling of participants was applied. According to Nieuwenhuis (2016b: 85), qualitative research in general utilises purposive sampling. The number of voluntary participants was nine primary school teachers. The researcher intended selecting more participants if the data saturation was not reached. Primary school teachers were used in this research as they have experienced the phenomenon required for this research. In this study, the sampling consisted of nine primary school teachers from schools in the Khomas region of Namibia (Figure 1). The population and sampling are further described in chapter 3.



#### **1.8.4 Data collection techniques**

The primary goal of this study was to examine the experiences of teachers using technology as a developer of inclusive education. Data for this proposed study was collected through semi-structured interviews and participant classroom observations. This data collection technique helped the researcher to gather information about the experience of teachers in the use of technology as a developer of inclusive education in primary schools in Namibia. The data collection methods used are further discussed in chapter 3.

#### **1.8.5 Data analysis**

Content analysis was applied to analyse the data collected through various semi-structured interviews and participant classroom observations. According to Nieuwenhuis (2016:111), content analysis can be defined as a systematic, replicable technique used to compress a multitude of words or text into fewer content categories, based on explicit rules of coding.

The data was further integrated to gain a deeper understanding of teachers' experiences of technology as a developer of inclusive education. The methods of analysis are further explained in chapter 3.

#### **1.8.6 Trustworthiness**

Trustworthiness is crucial in qualitative research. According to Nieuwenhuis (2016: 123), the decisive test of data analysis, findings, and conclusions lies in assessing trustworthiness. Nieuwenhuis (2016:123), suggests four criteria that qualitative researches should take into consideration. These are credibility, transferability, dependability, and confirmability. Chapter 3 explains how the researcher applied these criteria of trustworthiness.

#### **1.8.7 Ethical considerations**

The researcher adhered to the various ethical considerations recommended by Creswell (2009: 88), namely:

- Ethical issues regarding the research problem
- Ethical issues regarding the purpose and questions
- Ethical issues regarding data collection
- Ethical issues regarding data analysis and interpretation
- Ethical issues regarding writing and disseminating research

The ethical considerations relevant to the research study are discussed in more detail in chapter 3. The following section provides a brief outline and summary of all the chapters in this research study.

### 1.9 Chapter outline and summary

<b>Chapter</b>	<b>Summary</b>
<b>Chapter 1</b>	This chapter provides a background to the study as well as a brief discussion of the research problem, research questions, and research objectives. This chapter also describes the research design of this study.
<b>Chapter 2</b>	This chapter provides an overview of the literature regarding teachers' experiences of technology and inclusive education.
<b>Chapter 3</b>	This chapter provides a more expansive description of the research design and methods of the study.
<b>Chapter 4</b>	This chapter presents and discusses the qualitative data. It concludes with a summary of the most important categories that emerged from the data.
<b>Chapter 5</b>	This chapter provides a summary in which the findings are discussed, possible limitations are reviewed, and conclusions are drawn. In addition, recommendations for further research are provided.

*Table 1: Chapter outline and summary*

## **2. CHAPTER: TECHNOLOGY AS A DEVELOPER OF INCLUSIVE EDUCATION**

### **2.1 Introduction**

Children with disabilities are among the most marginalised and excluded groups in society and often face widespread rights violations. They are rendered uniquely vulnerable due to exclusion and inconspicuousness. Disregard for their right to respect, dignity, and individuality is almost a denial of their right to life itself. Stereotypically, children with disabilities are defined and judged by what they are unable to do rather than by what they can do. (UNICEF, *Children and Young People with Disabilities: Fact Sheet*, May 2013). Inclusive education enables teachers to include all learners in their lesson presentations, irrespective of the barriers to learning which they encounter (Brewer, 2014). Ramey (2013) is of the opinion that technology, when effectively used, enhances teaching and learning, which improves classroom practices for both teachers and learners. Several researchers, of which Jean Piaget and Lev Vygotsky are two of the leading theorists, have contributed significantly to the way we view children's learning.

This chapter provides a comprehensive overview of technology and inclusive education. The learning theories of Vygotsky and Piaget are also be discussed. In addition, to conclude this chapter, the modern interactive classroom and examples of technological devices that can support learners who experience barriers to learning, are discussed.

### **2.2 Vygotsky's Sociocultural Perspective**

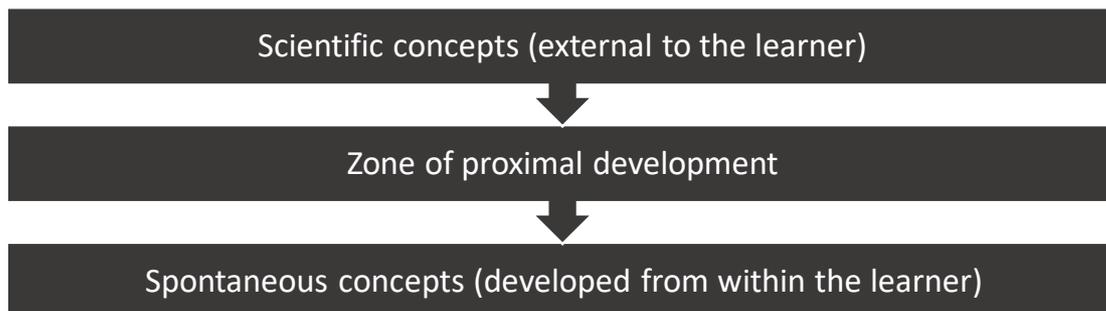
Vygotsky's theory is becoming increasingly relevant in the field of child development. He started exploring learning and development to improve his own teaching methods. His writing includes insights into language and thought, the psychology of art, learning and development, and recommendations for teaching special needs learners. He concluded that cognitive development in children is fostered by their interactions with others, for example, parents and teachers, who

are more proficient or advanced in their thinking. He also maintained that language is vital to the process of making sense of the world. This suggests that learners' interrelationships and the interactions between learners and adults associated with the learning environment are also important. In addition, Vygotsky recognised the important role of cultural tools, which include technical tools (e.g. mobile devices, computers, the internet, search engines, digital organisers, assistive technologies) and psychology tools (such as signs and symbol systems, Braille and sign language, maps, works of art, codes and language) in cognitive development (Woolfolk, 2013: 55-57).

Vygotsky distinguishes two levels of development that exist simultaneously in the developing learner, namely:

- **The spontaneous level of development** refers to what the learner can do on his or her own.
- **The potential level of scientific development** which entails expansion of the learner's competencies with optimal help and guidance from others.

Vygotsky calls the gap between the two levels “the zone of proximal development” (ZPD). It is during this phase that a child, if provided appropriate help and support, can become proficient at a certain task. (Woolfolk, 2013:55-60). The ability of a learner to switch from what he can already do to what can be done with support is an indicator of the learner's success. Vygotsky (Woolfolk, 2013:55-62) mentions that the two levels of development work in opposite directions. The scientific development level works downwards from external factors while the spontaneous concepts work upwards as reflective activities. This can be illustrated as follows:



According to Vygotsky the zone of proximal development is the area where learning and development are possible. Learning involves practice below the zone to encourage the child to develop skills to an automatic level. However, learning is also often charged with emotion. The emotional state that accompanies success can be very agreeable while the sense of failure can be very distressing, especially if it occurs frequently. Therefore, feelings have a strong effect on learning and can either support or inhibit learning.

“Scaffolding” to support learning is a concept that has been advanced based on a sociocultural view of learning (Wearmouth, 2009). Vygotsky believed that much of a child’s learning is supported or mediated by teachers or parents and the tools in their environment. While guidance is generally communicated through language. Wearmouth (2009) highlighted the following six elements of scaffolding learning that teachers can use to support learning in the classroom:

- Capture learners’ interest in the task.
- Show them how to do the task by demonstrating (modelling).
- Reduce the number of steps required to complete the task (where possible) so that learners can see ongoing progress.
- Control or manage frustration.
- Provide feedback on progress in a manner that learners will be able to comprehend.
- Encourage learners to participate and engage with the task.

Success will depend on the level of collaboration between the learner and the teacher. The scaffolding must function within the learner’s zone of proximal development. In addition to adult intervention, resources such as information technologies, peers, books, and materials may also be used to scaffold learning.

### **2.3 The implications of Vygotsky’s theory for this study**

Socio-constructivism refers to the social and cultural context of learning and the role that adults play in supporting learning. Assisted learning in the inclusive classroom

entails an understanding of the students' needs. It means that information, prompts, reminders, and encouragement must be provided at the right time and in the right amounts. At the same time, the student must be allowed to do progressively more on their own. Scaffolding or adult assistance will support learning and problem solving in the inclusive classroom where educators must actively interact and participate with the learners and support them in the learning process. Vygotsky's theory of supporting learning through imitation or collaboration will help teachers to create opportunities where learners work with their peers who are more experienced to develop to a higher level of cognitive functioning. This allows learners to catch up or to overcome barriers to learning. Vygotsky's recognised the important cognitive development role and complementary value of cultural tools, w technical tools (e.g. technology and assistive technology) and psychological tools (such as signs and symbol systems).

#### **2.4 Piaget's theory: Constructivism**

Piaget's fundamental insight was that individuals construct their own understanding and that learning is therefore a constructive process. His theory contributed greatly to primary schools organising their classrooms with the children in mind. It also accentuated the importance of providing an abundant learning environment with concrete materials and resources. Piaget's research concluded that learners construct knowledge through their interaction with their environment and what is in it. Their direct experience with their environment is therefore central to their learning. Piaget suggested that understanding a child's thinking will allow teaching methods to be matched to the child's current knowledge and abilities. (Wearmouth, 2009). He believed that the chief objective of education should be to help children learn how to learn. He was also adamant that education should "form not furnish" the minds of students. Piaget highlighted the importance of differentiating instruction pointing out that by understanding children's thinking, teachers would be able to more competently match their teaching approaches to the children's existing knowledge and abilities. (Woolfolk, 2013).

### **2.4.1 Influences on development**

Piaget identified four factors that interact to influence changes in thinking (Woolfolk, 2013;43):

#### **Maturation**

Maturation entails the materialisation of genetically programmed biological changes. It has a significant effect on the way we make sense of our world.

#### **Activity**

Physical maturation is accompanied by an increasing ability to act on the environment and to learn from it. As we do so, by exploring, testing observing, and eventually organising information, we are likely to simultaneously adjust our thinking processes.

#### **Social transmission**

As we develop, we continuously interact with the people around us. Piaget believed that that this interaction and everything we learn from others affects our cognitive development.

#### **Equilibration**

According to Piaget, the process of equilibration is what drives our development. This involves finding a mental balance between cognitive schemes and information from the environment. Piaget's hypothesis was that people constantly test the adequacy of their thinking processes to achieve that balance.

### **2.5 The implications of Piaget's theory for this study**

According to Piaget, students in any classroom tend to differ significantly in terms of their level of cognitive development and their academic knowledge. Learners in this research were carefully observed in inclusive classrooms while they endeavoured to solve problems presented to them. In the inclusive classroom, learners will have a wide range of cognitive abilities. Using multi-level lessons or differentiated instruction will help to address their individual learning needs. Piaget's theory will help teachers to balance teaching work to ensure that it is not too boring

or too simple. It will also enable them to take care that no child falls behind due to teaching that he or she cannot understand.

## **2.6 Teacher's experiences**

Wearmouth (2013) is of the opinion that teachers' understanding of learning and their perception of what it is that causes "learning difficulties" in school strongly affects how they respond. They may react to learners' difficulties in various ways. Some might be inclined to focus on what is wrong with a child, while others might be more concerned about the welfare of the child. Another context in which to view these difficulties would be to examine the social context in which learning occurs. This entails looking at the context itself and examining whether the physical environment, resources, teaching approaches, the difficulty and/or interest level of the person's surroundings may be creating a barrier.

## **2.7 Technology**

The Organisation of Eastern Caribbean States (OECS, 2012) describes technology as involving "the use of problem solving, technological processes, and resources to find solutions to people's wants and needs." Technology is a human activity in which individuals can participate. It entails the use of materials, energy, tools/machines, and information. Technology changes over time and is neither good nor bad. What is of importance though, is the manner in which we use it, as technology can positively and negatively affect our lives. ICT stands for information and communication technology. According to Kale and Goh (2012), ICT is defined, as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store and manage information". Kale & Goh (2012) refer to ICT as technology which consists of electronic devices and associated human interactive materials that, in addition to personal use, make them suitable for use in a wide range of teaching-learning processes.

The Department of Education of South Africa, views technology as the application of knowledge, skills, and resources to address the needs and wants of individuals

by finding practical solutions to problems, while keeping social and environmental factors in mind (DoE, 2009: 19).

Rogers (2006) describes technology as a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome. It consists of hardware and software. Rogers views technology as “a design for instrumental action that reduces the uncertainty in the hardware and software”. Vahedi (2015) holds that the integration of new media into learning is a necessary step to safeguard the acquisition of the kind of teaching and learning needed for living and working in the knowledge society. Due to the growing reliance on information technology (IT), learning how to use technology is often an essential part of public educational curricula (Vahedi, 2015). Technology is not a single entity. It incorporates a range of characteristics, as shown by the definitions provided. Vahedi (2015) explained the importance of integrating new media into learning to prepare the youth, “the foundation of every nation”, to be able to work and cope in the knowledge society of the future.

### **2.7.1 ICT in teaching and learning**

As educators, we cannot ignore the fact that we are living in an information technological age. We must try to find ways to adapt and use the technology to our advantage (Hugo, 2014:217). It is changing our approach to learning. ICT should therefore be included in teaching and learning offerings in the classroom.

Gates and Gates (2015) remark that in spite of the fact that digital information and communication technology (ICT) is an essential part of most Africans’ daily lives; it is found to be mostly lacking in the general school environment. There is an urgent need for ICT to be included in classroom teaching and learning. According to Kale and Goh (2012), many schools have only started to realise its true potential. As teachers, we must prepare learners for the future by providing them with an interest in lifelong learning to motivating them to become autonomous in the new century (Kale & Goh, 2012). Teachers realise the importance of changing classroom practices to keep up with the digital realities of the modern era (Kale & Goh, 2012). They need to continue to adapt to the new landscape of education as the world is

rapidly changing. As Terronez (2018) points out, we must remember that the future of every nation is in our classrooms.

Technology has long been recognised as a potential phenomenon in the learning environment that deserves our attention. Hugo (2014:217) holds that technology has significantly transformed our lives over the past few decades. It is therefore essential that we apply these technological advances in our approach to our children's education. It is not about *what* we teach, but *how* we teach. Technology can help to transform the classroom experience from the classic approach, which focuses on the teacher, to one in which the centres on the student (Hugo, 2014). This will ensure that children play a more active part in their learning (Norman 2016). Norman (2016) further explains that it is important that children have opportunities to make choices in the learning environment. Technology provides tools that can help children to gain more independence to complete their work in the classroom and to feel more successful at school (Norman, 2016). As teachers, we need to prepare learners for their future by providing them with an interest in lifelong learning and by motivating them to become autonomous users of digital technologies in the new century (Norman, 2016).

To understand the new "tools" that teachers require to teach effectively in this new century, we must first understand how the learning environment has changed.

### **2.7.2 Users of technology**

Norman (2016) is of the opinion that the development of technology will determine the future of the educational system. He holds that proper integration of technology will allow students to be guided to better understand the various concepts dealt with in the classroom.

Information and communication technology (ICT) refer to technologies that provide access to information through telecommunications such as cell phones, the internet, and wireless networks (Norman 2016). According to Kale and Goh (2012), the inclusion of ICT in education is essential due to the rapidly growing use of technology in almost every aspect of life.

Kale and Goh (2012) also emphasise the growing importance and need to use technology, especially in the classroom. The applications described by Kale and Goh (2012) are relevant to the current study as they are aimed at the development of inclusive education.

Kale and Goh (2012) found technology to be:

- a useful tool to motivate students to learn in a different way,
- effective and efficient,
- dynamic and interactive, and
- a means to provide learners immediate access to a greater variety of source materials.

Kale and Goh (2012) discuss some applications for technology in education. These include:

- Providing (in the form of, for example, online facilities or CD-ROMs) useful sources of information in different subjects.
- Facilitating communication with/for pupils with special needs.
- Allowing the use of electronic toys/devices to develop spatial awareness and psycho-motor control.
- Supporting collaborative writing and sharing of information (through online resources like email, chat, and/or discussion forums).
- Involving a wide range of students from distant geographic areas (e.g. via video-conferencing or other forms of teleconferencing).
- Permit blended learning by combining conventional classroom learning with e-learning systems.
- Expediting the processing of administrative and assessment data.
- Promoting the exchange and sharing of ideas among teachers to enable professional growth.
- Enabling users to carry out internet-based research to enhance the educational process.

In terms of teaching and learning, ICT can be defined as a suitable tool with which to enhance students' capacity, productivity, and performance (Norman, 2016).

The following information communication tools are used by learners in most primary schools:

- Computers, tablets, iPads, MP3 players
- Educational software programs
- Digital cameras
- Scanners
- Digital microscopes
- Other digital equipment for communication
- Programmable toys and learning devices

The objective of integrating ICT with general classroom learning and teaching is to help learners to discover that ICT helps people, and teachers in particular, to perform their tasks more rapidly and effectively. It also enables them to find and present information faster (Norman, 2016). The American Academy of Pediatrics (2009, 2010, 2011), as well as the joint statement of the National Association for the Education of Young Children and the Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College (2012) explain the advantages and disadvantages of early exposure to ICT.

### **2.7.3 Advantages and disadvantages of early exposure to ICT**

ICT holds definite benefits for learners in primary schools when it is applied in a responsible manner to teaching and learning. It is, however, important that ICT not be applied in an indiscriminate manner in the classroom as this could have an adverse outcome (American Academy of Pediatrics, 2011). ICT can have a negative effect on a learner's academic performance if it is used in a mindless way at home. For this reason, teachers, as knowledgeable professionals, have a responsibility to inform parents of the possible negative effects should ICT not be used correctly (American Academy of Pediatrics, 2011).

<b>Advantages</b>	<b>Disadvantages</b>
<b>Increased knowledge</b>	Obesity among young children
<b>Increased long-term memory</b>	Irregular sleep patterns
<b>Increased verbal skills</b>	Behavioural issues
<b>Advanced problem-solving skills</b>	Focus and attention problems

Table 2: Advantages and disadvantages of early exposure to ICT

Sources: American Academy of Pediatrics, 2009, 2010, 2011

#### **2.7.4 Developmentally appropriate ICT teaching and learning in primary schools**

The type of activity and technological devices chosen for teaching and learning must be appropriate for the learners' age and development level. The National Association for the Education of Young Children and The Fred Rogers Centre (2012) published a number of principles (*cf.* Table 2) to clarify what is meant by developmentally appropriate ICT. This will assist teachers to plan ICT activities and learning material that are developmentally appropriate.

An interactive learning environment is key to all learning that occurs in primary school classrooms. This is even more applicable when technology is used. Teachers should take care not to allow teaching and learning to revert to mere look-and-learn sessions for learners.
For Gr 1-3 learners, ICT screen time (including television and computer use) should be limited to two hours per day.
For Gr 4-5 learners screen time (including television and computer use) should be limited to three hours per day, while screen exposure (including television and computer use) for Gr. 6-7 learners should not exceed four hours per day
ICT tools should be supplemented with educational and developmentally appropriate activities. For example, it is not recommended that grade 1 learners be given electronic worksheets to complete.
Teachers need to have a good comprehension of child development theories.

It is important that equal opportunity to education is taken into account alongside the integration of developmentally appropriate technology. This means that provision must be made for those learners who do not have access to a computer or other ICT tools at home. Classroom teaching and learning must accommodate these learners to ensure that they have an equal opportunity to develop their ICT skills.

Table 3: Principles for developmentally appropriate ICT in teaching and learning

Source: The National Association for the Education of Young Children and The Fred Rogers Centre (2012).

## 2.8 Inclusive education



INCLUSIVE.  
GOOD QUALITY EDUCATION  
IS A FOUNDATION FOR  
DYNAMIC AND EQUITABLE SOCIETIES.  
——— DESMOND TUTU ———

Figure 2: Quote by Desmond Tutu

Teachers worldwide will have to teach in a variety of ways harnessing various technologies to enhance their teaching practices and to ensure that they become even more inclusive (Brewer, 2014). The principle of inclusion is of great relevance, particularly where the development of education policies is concerned. Breiling (2017) holds that all individuals should have equal access to education, regardless of their physical, learning or any other disability, social status, or gender.

The contemporary classroom is more diverse and more inclusive than ever before with much greater potential to implement technology. Tomlinson (2014) explains

that teachers need to meet today's challenges in a modern, more compelling and practical manner that should be totally timeless. They should, for example, know how to divide their time, resources, and efforts to be able to effectively instruct large groups of students from diverse backgrounds and with varying levels of readiness, skill, and interests.

Tomlinson's explanation of how to teach in today's classrooms is very relevant to the current study given the importance of teaching in different ways to address the different requirements of learners in the inclusive classroom.

Tomlinson (2014) recommends that teachers:

- employ various methods of teaching
- explore the diversity of the curriculum and the learning environment
- share strategies for instruction
- respond to the needs of all learners
- assist every learner to attain and broaden their knowledge, enhance skills, and expand understanding.

The Salamanca statement acknowledges that children all have different characteristics, capabilities, and requirements. It emphasises the right of all children to education (UNESCO, 1994: VIII-VX). The Dakar Education Conference, emphasised the objective of inclusive education as providing support for children who are adversely affected in various ways due to learning disabilities, ethnic backgrounds, or living conditions in rural areas (Ministry of Education of Namibia, 2013:2).

Learners should have equal and equitable opportunities to take full advantage of their education. The drive to ensure that children with disabilities are included in all areas of society started in the developed countries in the 1970s (Bayat, 2014). Various governments globally have accepted the challenge to develop inclusive education practices (Breiling, 2017:1).

Breiling (2017:4) is of the opinion that inclusive education is a commonly-implemented approach worldwide because it perfectly supports the rights of children

with special needs (Breiling, 2017:4). The intention is to ensure the right of all children to participate in mainstream schools and to be educated with their peers. However, while inclusion is considered a desired state worldwide, various obstacles to successful inclusion still exist (Breiling 2017:21)

DeWitty (2016) asserts that inclusion is a central component of diversity which contributes to helping participants feel safe, welcome, and able to engage.

*“Inclusivity is a way of life, a way of living together; based on a belief that each individual is valued and does belong”* (Villa et al., 1995:279).

*“Inclusion is the act of engaging people with disabilities in all daily activities – at school, at work, at home, and in the community”* (Inclusion Network, 2006).

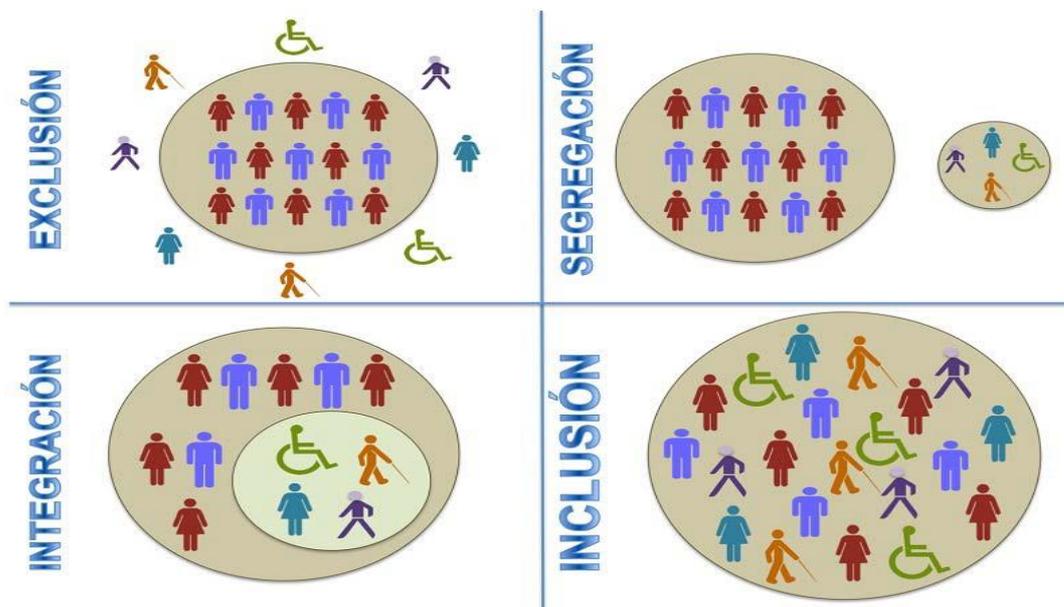


Figure 3: Inclusion vs exclusion

Source: Inclusion in Education (Chambers, 2017)

The movement toward inclusive education (IE) has managed to bring about substantial change to education in the 21<sup>st</sup> century. Identifying and teaching learners with diverse needs is one of the new challenges facing teachers (Eredics, 2018). According to Eredics (2018), inclusive education means that teachers need

to be able to accommodate various levels of diversity in their classrooms. Schools are required to provide a more caring environment in which all learners are accepted and treated equitably and with respect, irrespective of their circumstances or backgrounds (Chambers, 2017). Teachers also need to develop more abundant learning environments for those who have special educational needs, because every child is unique. Diversity in classrooms leads to the emergence of more individual learner needs which means that the differences of all learners must be taken into account (Chambers, 2017). To provide every unique learner the opportunity and support to achieve his or her full potential a range of teaching strategies is required. This implies that the system needs to address the learner's needs and not that the individual should change to fit the system (Chambers, 2017). Eredics (2018) also found that it is essential that teachers teach children in a way that they become independent learners. This explanation of inclusivity by Chambers (2017) most closely reflects the view of the current study that teachers need to use various teaching approaches, technology among others, to address the needs of every learner and to help them reach their full potential. By using technology, we prepare learners for the future by providing them with an interest in lifelong learning and motivating them to become autonomous in the new century. Inclusion makes sense socially as it concerns the personal development of every individual and takes into account the relationship between individuals, groups, and even entire nations (Rieser, 2011). In addition, it creates potential for the development of unique relationships and safeguards the right to be an equal member of society (Chowdhury, 2011:4). Teachers need to know how to help learners who are face with barriers so that they can improve their quality of life. It is necessary to develop more abundant learning environments for those who have special educational needs.

The drive for inclusive education holds broader implications for inclusion and diversity in society in general. The following remark by McKenzie (2016) on her blog on Future Learn illustrates this impeccably:

*“Listening to a school principal who has contributed to this online course, I was struck by what she said about parents at her inclusive school. These parents did not grow up among children with disabilities, as during their childhood those children*

*were either separated from other “normal” children into special education programmes, or not sent to school at all. Parents can therefore often struggle more with the idea of inclusive education than the children themselves. This made the researcher think about how powerful both exclusion and inclusion are in shaping the way we think about our world, and highlighted for the researcher the need to promote inclusion in education if we are to develop a socially cohesive society in which everyone can participate and have a role to play.”*

McKenzie (2016) explains that understanding how to include disability in our schools and classrooms could have a cumulative effect on how we approach other forms of diversity. McKenzie provides the example of a child who has a visual impairment. For the needs of this child to be met in the classroom, the teacher could try to ensure that everything that is presented visually is also read out loud. This would not only facilitate this child’s learning, but at the same time will assist other children who may not have a visual impairment but may have a more auditory style of learning or face other learning obstacles, such as low literacy levels.

School prepares a child to be a member of society. Therefore, it is of immense importance for children to be educated along with their peers (Rieser, 2012). To be able to accommodate all children and to ensure that all children benefit, regardless of their physical, learning or any other disability, social status, or gender, requires schools to develop new approaches to teaching. Hugo (2014) holds that is the reason that interactive learning, (that is, finding ways to activate many parts of the brain while learning), is very effectively used for inclusive education purposes and will make it possible for children who underperform in certain areas to excel in ways they never thought would be possible (Hugo, 2014).

### **2.8.1 Inclusive education in Namibia**

Namibia’s legislative environment sanctions inclusive education. According to the 2011 Namibia Population and Housing Census (NPHC), 3,3% of children between the ages of 6 and 19 have some form of disability. This means that more than 21000 children have disabilities. The NPHC (2011) established that only 65% of these children were attending school compared to 79% of children without disabilities who attended school. This comparison suggests that another

approximately 5000 children were not attending school due to disability. It is, however, important to note that Namibia, as a developing country, does not have updated statistics regarding children with disabilities (Assessing Inclusive Education in Practice in Namibia, 2018).

The Ministry of Education of Namibia (2008:4) found that children are faced with various barriers to obtaining education. This highlights the importance of and need to develop inclusive education practices in the country. In Namibia, inclusive education is based on the principle that every child matters and has a right to education. This also includes the conviction that education should be based on access, equity, quality, and lifelong learning (Ministry of Education Namibia, 2008:13).

The Namibian curriculum defines inclusive education as instruction at school level that ensures that the physical and social environments accommodate all learners and that all the required teaching and learning supports are provided (Ministry of Education, 2009:38).

The Ministry of Education (2009:38) requires that all learners be accommodated in mainstream schools and that schools provide for all learners' needs with regard to learning materials and educational adjustments. Provision should also be made in special units, classes, or schools to accommodate learners who due to the severity of their impairments cannot yet benefit from inclusion in mainstream education (Ministry of Education, 2009:3).

Namibia's National Agenda for Children 2012-2016, states that: *“Education should be valued as a key social investment and a means to reduce inequality. Inclusive strategies are needed to respond to marginal communities and students with special needs. Education legislation is committed to making education a right and making explicit the link between education and improving human capital and economic development”* (Government of the Republic of Namibia, 2011).

*“Inclusive education can be seen as a process of strengthening the capacity of an education system to reach out to all learners. It is, therefore, an overall principle that should guide all educational policies and practices, starting from the belief that*

*education is a fundamental human right and the foundation for a more just society.”*  
(UNESCO 2008, cited by Ministry of Education of Namibia, 2018)

Namibia, as a signatory to the Convention on the Rights of the Child, and the Convention on the Rights of Persons with Disabilities, remains committed to ensuring that all her people have access to quality, integrated services. Namibia has national legislation and policies in place that promote the rights of children with disabilities. These include the *Sector Policy on Inclusive Education*, the *Child Care and Protection Act, 2015* (Act No. 3 of 2015), the *Education Act, 2001* (Act No. 16 of 2001), and the *National Disability Act, 2004* (Act No. 26 of 2004). The objective of this legislation and policies is to increase the capacity of the education system by providing for each individual’s right to education (Assessing Inclusive Education Practice in Namibia, Ministry of Education, 2018).

There are many attempts to develop inclusive education. Children who tend to struggle more than others also need to be taught in different ways to give them an opportunity to use different methods to show what they know (Chambers, 2017). In most of the cases, these children will need assistive technology (AT) after an individual education programme (IEP) evaluation has been considered by an IEP team, with options that will work best for the child’s specific needs. This will give them an equal chance to succeed in school. Research shows that students who have academic problems often have a special ability with computers. As a teacher, it is important to know more about your learners, because the more you know about them, the better you will be able to support them. The more you understand what their needs are, the more you can help them attain a better quality of life. Eredics (2018) found that technology gives learners many opportunities to grow. Therefore, it is one of the tools which can be used to serve learners better and to develop inclusive education. In an inclusive classroom, learners are not expected to “keep up” but to “keep learning”.

## **2.9 The modern interactive classroom**

To be successful as a teacher, one must improve learners’ abilities and address their thinking. Gardner (1983) in his Theory of Multiple Intelligences, describes eight abilities. These are, musical-rhythmic, visual-spatial, verbal-linguistic, logical-

mathematical, bodily-kinaesthetic, interpersonal, intrapersonal, and naturalistic. Understanding the multiple intelligences will enable educators to determine different ways to teach learners more effectively.

Tomlinson (2014) found that the modern classroom is more diverse and more inclusive than ever before with much greater potential to implement technology. Teachers therefore need to know how to effectively divide their time, resources, and efforts to be able to instruct large groups of students from diverse backgrounds and with varying levels of readiness, skill, and interest. In the modern interactive classroom differentiated instruction will help teachers to know what to differentiate, how to differentiate, and why. (Tomlinson, 2014). Teachers will have to address the needs of all learners. The outcome will be that each of the unique learners in the classroom will attain greater knowledge, more advanced skills, and an increased understanding (Tomlinson, 2014).

As teachers, we must realise the importance of changing classroom practices to keep up with the digital realities of the modern digital era. Eredics (2018) is of the opinion that inclusive classrooms establish social and emotional support for all learners. Eredics (2018) also found that a healthy learning environment must be maintained by teachers using strategies and being responsive to learners' needs. According to DeWitty (2016), diverse inclusive environments can enhance student learning. DeWitty (2016), describes diversity as all the ways in which people differ but also the effect which those differences have on our thinking and behaviour. This includes socio-economic status, race, ethnicity, language, gender, religion, and age.

DeWitty (2016) further points out various reasons why diversity matters.

- It creates a quality learning environment.
- Educational analysis is deepened through broader experiences.
- Tolerance is increased while prejudice is reduced.
- Global markets require a diverse workforce to meet increased demands.

DeWitty (2016) recommends that teachers attempting to create a positive climate for learning should consider the following:

- Students' contributions should be valued.
- Wrong or partially correct responses should be regarded as useful starting points for learning.
- Students should be helped to answer.
- Means to check for understanding should be included.
- Different ways of explaining should be found.
- The manner of instruction should encourage participation and learning.

Teaching methods to inspire the students of the future will have to focus on classroom conditions that are flexible and aesthetically pleasing. It should make students feel more comfortable to encourage learning (Ruhl, 2015). Ruhl (2015) further explains that a modern interactive classroom will:

- provide choice (we are wired for free will)
- encourage collaboration (we are wired to be social creatures)
- facilitate communication (we are wired to be social)
- stimulate critical thinking (problem-solving skills)
- inspire creativity (a uniquely human pleasure)

The following remark by Gates and Gates (2015) will remind teachers of the importance of this field of knowledge that will grow progressively faster in the future.

“... we think the next 15 years we will see major breakthroughs for most people in poor countries ... These breakthroughs will be driven by innovation in technology – ranging from new vaccines and hardier crops to much cheaper smartphones and tablets – and by innovations that help deliver those things to more people.”

The tablet is already used for teaching and learning in many classrooms around the world. It will therefore not be beneficial for future teaching and learning if teachers shy away from this reality (Eredics, 2018). Eredics (2018) emphasises the need for teachers to be knowledgeable of the different technologies available that can help them to enhance their classroom practices. It is imperative that all learners be enabled to contribute to and benefit from classroom learning to reach their full potential. Brewer (2014) states that assistive technologies are becoming more commonplace for children with special needs. We can expect the technology in this

field to continue to change and develop, making such assistance more readily available. Teachers can use assistive technologies (AT) as tools to improve their presentations and help to support learners in overcoming barriers by enhancing equal opportunities for learning in the inclusive classroom.

### **2.9.1 Defining assistive technologies (ATs)**

As discussed, (*cf.* paragraph 2.2.1), the purpose of technology is to enhance our lives and make our work easier. Hugo (2014:217) found that the internet is not only informative, but also gives children in Third World countries insight into how modern societies operate and vice versa.

Assistive technologies (AT) can be defined as those tools that are used to assist learners who encounter barriers of some kind in their day to day tasks in the classroom (Chambers, 2017). It is, in essence, any tool that assists in learning and interaction to help learners to interact with the world around them by helping them to overcome learning barriers (Chambers, 2017). These learners will be able to fully participate in a natural, inclusive environment, which will greatly contribute to the quality of their lives. AT has a broad spectrum to support learners with disabilities from low-cost or low-tech options to high-cost or high-tech options. Low-tech options will help learners with developmental and learning disabilities to accomplish simple tasks and prevent challenges whereas high-tech options will help learners to further develop their interest through active learning experiences.

Assistive technology provides different options that can be harnessed to assist children with learning disabilities and learning problems. This broad concept covers almost anything that could be employed to compensate for a deficiency in ability (Reed & Bowser, 2005). Eredics, (2018) discusses the availability of high-tech and low-tech options that can be adopted. High-tech options include apps or devices, for example dictation software, laptops, computers, iPads, and typing programs. Low-tech options are, for example, specific pencil grips, slant boards to help with writing issues, a heavy-duty rubber band around the legs of a chair to help a child with his/her attention issues, etc. Eredics, (2018) also found that assistive technology is used to support an education programme in an inclusive classroom and that learners are not expected to “keep up” but to “keep learning” Considering

the many benefits of technology and the way it complements inclusive education, it is important that assistive technology is used to address the diverse needs of children, including those with diminished ability. Inclusion will prepare our children for a future in our diverse world (Eredics 2018).

### **2.9.2 Examples of assistive technologies for primary school learners**

Learning difficulties and learning disabilities prevent many children from progressing at school (Brewer, 2014). These barriers can be physical disabilities as well as difficulties with reading, writing, and communication in a second language. This may mean that not all learners excel at an equal pace. Brewer (2014) believes that it is imperative that learners be helped to attain equal footing with their peers before their difficulties become more difficult to manage. This will also reduce emotional problems associated with failure.

Assistive technologies (AT) include any tool which assists in learning and interaction to help learners that experience barriers of some kind. AT can be used to assist learners with their day to day tasks to help them to participate in a natural, inclusive learning environment. It does not change what the child is learning; instead it makes it possible for a child to work around challenges and contributes greatly to the quality of their lives (Chambers, 2017).

AT has a broad variety to support learners with disabilities from low-cost or low-tech options to high-cost or high-tech options. Low-tech options will help learners with developmental and learning disabilities to overcome challenges and accomplish simple tasks (Chambers, 2017). On the other hand, high-tech options will help learners to further develop their interests through active learning experiences.

It appears that learners who experience academic problems often have a special skill with computers (or technical devices). This means that technology can help these learners to have an equal chance to feel academically successful in school (Hasselbring T. S. and Glaser, 2000)

Examples of assistive technology (AT) that can support learners who experience barriers to learning in primary schools:

<b>LOW-COST/LOW TECH</b> devices or equipment (do not require much training)	
<ul style="list-style-type: none"> <li>• Seat cushions</li> </ul>	Support learners' concentration span, especially learners diagnosed with ADD and SPD.
<ul style="list-style-type: none"> <li>• Specially designed props for sitting</li> </ul>	Sitting up to interact with peers when engaged in groupwork/collaborative learning.
<ul style="list-style-type: none"> <li>• Pencil grips</li> </ul>	For holding pencils and paintbrushes.
<ul style="list-style-type: none"> <li>• MP3-audio players and Audacity Recording program – free download</li> </ul>	Help learners to process auditory information to improve reading-related activities and comprehension.
<ul style="list-style-type: none"> <li>• Special handles on writing utensils as well as drawing implements</li> </ul>	Supporting learners with poor grip to complete writing tasks or activities with ease within the allocated time.
<b>HIGH-COST/HIGH TECH</b> devices or equipment (complex devices/equipment, maybe computerised, have digital or electronic components, will likely require training.	
<ul style="list-style-type: none"> <li>• Rhyme to read</li> </ul>	An effective program for beginner readers or to enhance the reading fluency of older readers that struggle with reading.
<ul style="list-style-type: none"> <li>• Speech-to-text devices</li> </ul>	Hardware and speech recognition software that converts words that are spoken aloud to electronic, written text. It is used to support increased demonstration of learning, potential, and independence. It is useful for learners that experience handwriting challenges as well as dyslexic learners who experience barriers with written language.
<ul style="list-style-type: none"> <li>• Text to speech devices</li> </ul>	Software computer programs that convey displayed information through voice, helping learners with reading challenges.
<ul style="list-style-type: none"> <li>• iBook</li> </ul>	For Mac users. Strategies to boost reading comprehension for learners with low comprehension and attention.
<ul style="list-style-type: none"> <li>• Spell Better</li> </ul>	Helps learners with poor spelling skills to improve their proficiency.

Table 4: Low- and high-cost assistive technology

Source: Naude & Meyer (2020: 173)

Technology has long been recognised as a potential phenomenon that deserves our attention in the learning environment. The new landscape of education is rapidly changing, and teachers will have to adapt to it because we are living in an information technological age. Hugo (2014:217) states that teachers must find creative ways to adapt and use the system to their advantage. By doing this, we are creating tomorrow's teachers today. Brewer (2014) is of the opinion that education should help learners think creatively, see beyond themselves and relate learning to life's realities. Therefore, we have to modify instruction and set the stage for children to develop in all areas. The effective use of technology in education has transformed traditional education and increased access to and availability of educational opportunities (Ramey, 2013).

## **2.10 Conclusion**

We need to understand the connection between inclusive education and the employment of technology in the classroom. Communication technologies do not only refer to devices such as the internet, to extract information, it also means that we use technology to communicate with one another. Technology in primary schools can improve learning and as a result improve the quality of life which results in success in life. When learners' quality of life and learning are enhanced, everything else in their lives (for example, self-confidence, school performance, social relationships, family and home life) improves. However, additional research is needed to more comprehensively look at how technology can promote inclusive education. Further investigation the challenges that teachers face when technology is used as an educational tool in the classroom is required. There is also a need to develop effective ways to address these challenges experienced by teachers in the Namibian context.

This chapter sets the conceptual outline for this study with a discussion of each section. The researcher has provided an in-depth look at the following concepts: technology, inclusive education, the modern interactive classroom, and technological devices in the classroom and has also expanded in detail regarding the connections between the various concepts. In chapter 3, a thorough explanation of the research design used in this study as well as a motivation for the chosen design is provided.

## **3. CHAPTER: RESEARCH DESIGN AND METHODOLOGY**

### **3.1 Introduction**

In chapter 2, the literature of technology and inclusive education as well as teachers' experiences of the modern classroom were outlined. Chapter 3 aims to define and motivate the methodological purpose. The various aspects of the research design, such as the methodology, paradigm, sample, methods of data collection, and data analysis are described. Finally, aspects related to trustworthiness and ethics are discussed.

### **3.2 Research design**

Nieuwenhuis (2016b:72) defines a research design as a plan or strategy that moves from the underlying philosophical assumptions to specify the selection of participants, the data gathering methods to be used and the data analysis to be done. The choice of the research design is based on researchers' perspectives, research skills, and research practices, and affects the way in which they collect data (Nieuwenhuis, 2016b:72). According to Nieuwenhuis (2016b:73), the research design is intended to help one understand the actual structure of the study as well as to plan and conduct the qualitative study. The chosen research design will be explained. The methodology, paradigm, selection of participants, the instruments and data collection techniques and the data analysis and interpretation will be discussed.

The research design is presented below:



Figure 4: Research design

### 3.3 Research methodology

The term *methodology* serves merely as a strategic but malleable guide throughout the research (Nieuwenhuis, 2016b:74).

The methodology of this study was qualitative and followed a multiple case study. McMillan and Schumacher (2010:344) explain that a case study is an in-depth analysis of a single entity. McMillan & Schumacher (2010:344) refers to a case study as an in-depth exploration of a bounded system (e.g. an activity, event, process, or individuals) based on extensive data collection. It is important to understand personal experiences for this study and that is why qualitative methods were best suited to collect and analyse data. Qualitative research aims to understand the socially constructed world and is suitable, especially when

individuals' own experiences, past development, impressions, and opinions need to be understood deeply (Breiling, 2017).

A case study is popular in education research as well as in this proposed study because the researcher would like to collect data from persons who have experienced the phenomenon of using technology to develop inclusive education.

### **3.4 Research paradigm**

The research paradigm of this research complemented interpretivism because the aim of this kind of research is to offer a perspective of a situation and to analyse the situation under examination to provide insight into the way in which a particular group of people makes sense of their situation or the phenomena they encounter (Nieuwenhuis, 2016b:62).

According to Nieuwenhuis (2016a:62), one can conclude that the interpretivist perspective is based on the following assumptions: Human life can only be understood from within and the human mind is the purposive source or origin of meaning. Interpretivism applies to the research question, as one can develop a sense of understanding of the meanings that people imparted to phenomena and their social context (Nieuwenhuis, 2016a:61).

### **3.5 Population and sampling**

Purposive sampling of participants was applied. According to Nieuwenhuis (2016b: 85), qualitative research in general makes use of purposive sampling. According to Romney *et al.* (1986), the sample size should not be so large that it is difficult to extract thick, rich data. At the same time, as noted by Sandelowski (2010), the sample size should not be so small that it is difficult to achieve data saturation. In the context of this study, the participants were primary school teachers.

There are no rules for deciding the sample size when using qualitative research designs. The sample size will depend on what the researcher wants to know, the purpose of the research, and why it will be relevant. It should also enhance the transferability of the findings and be feasible in terms of time.

The number of voluntary participants was nine primary school teachers. The researcher intends to select more participants should the data saturation not be reached. Primary school teachers were used in this research as they have the experience of the phenomenon required for this research. In this research, the sampling consisted of nine primary school teachers in the Khomas region of Namibian schools. Technology-rich schools, where teachers have experience regarding the use of technology as a pedagogical tool, were selected.

**The table below indicates the descriptions of the nine primary school teachers:**

	<b>School Name</b>	<b>Age</b>	<b>Educational background</b>	<b>Experience (Years)</b>	<b>Type of Technology</b>
Teacher 1:	Welwitschia	35	Ed Tech	2	<ul style="list-style-type: none"> <li>• C-Pen's</li> <li>• Tablets</li> <li>• Tv's</li> <li>• Digital White Boards</li> <li>• Educational software</li> </ul>
Teacher 2:		40	Diploma in Teaching	13	
Teacher 3:	Windhoek	24	B. Ed	2	<ul style="list-style-type: none"> <li>• Tv's</li> <li>• Audio Books</li> <li>• MP3 Players</li> <li>• Tablets</li> <li>• Projectors</li> <li>• Educational software</li> </ul>
Teacher 4:	Afrikaans	28	B. Ed Hons	6	
Teacher 5:	Private school	47	Higher Education Diploma (HED)	11	
Teacher 6:		46	Diploma in Teaching	24	
Teacher 7:	Windhoek Internation	42	Diploma in Special Needs	18	<ul style="list-style-type: none"> <li>• Google Classroom</li> </ul>
Teacher 8:	al School	41	M. Ed	17	

Teacher 9:		45	Higher Education Diploma (HED)	21	<ul style="list-style-type: none"> <li>• Educational software</li> <li>• Smart boards</li> <li>• Tablets</li> <li>• Robotics</li> </ul>
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Table 5: Description of Participants of Study

Source: Researcher's own table

### 3.6 Instruments and data collection techniques

The purpose of research is to familiarise oneself as researcher with some of the techniques that are most used. The primary goal of this study was to examine the experience of teachers using technology as a developer of inclusive education.

According to Nieuwenhuis (2016b:87) most qualitative studies do not treat data collection and data analysis as two separate processes but see them as an ongoing, cyclical, and nonlinear process. Data for this study was collected through semi-structured interviews and participant classroom observation. This data collection technique helped the researcher to gather information about the experience of teachers using technology as a developer of inclusive education in primary schools in Namibia.

#### 3.6.1 Semi-structured interviews

According to Nieuwenhuis (2016b:93), the aim of qualitative interviews is to see the world through the eyes of the participant, and they can be a valuable source of information, provided they are used correctly. It is expected of participants to answer open-ended questions that will make provision for further investigation and explanation.

The researcher used semi-structured interviews to collect data by interviewing the teachers and observing them using technology as a pedagogical tool as well as

observing the learners' experiences and development in the classroom as a qualitative design uses multiple perspectives (McMillan & Schumacher, 2014).

The semi-structured interview has advantages and disadvantages:

### **Advantages**

- It is commonly used in research projects
- It seldom spans a long-time period
- The interview is developed by the researcher prior to the interview
- Participants can provide historical information
- The researcher has control over the way the interview develops

### **Disadvantages**

- It is easy to become side-tracked by trial aspects that are not related to the study

Open-ended questions also have advantages, such as:

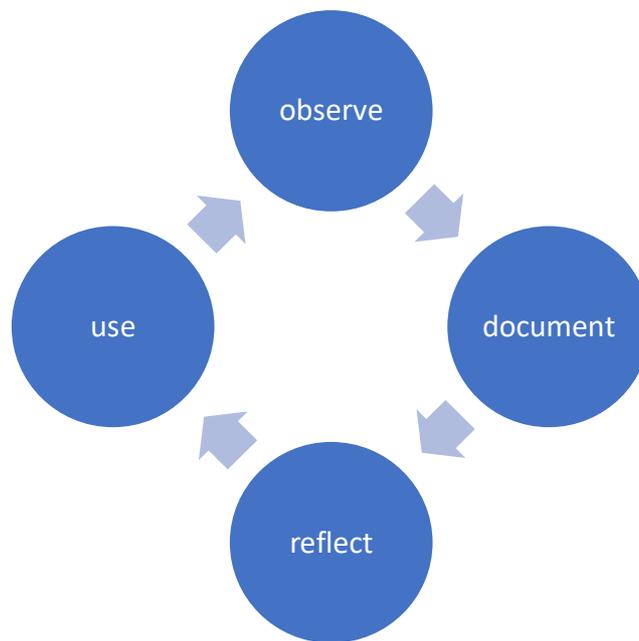
- Participants provide honest answers in detail
- Participants' thinking processes emerge
- The analysis of participants' answers will deliver interesting information, categories, and sub-categories.

Semi-structured interviews were conducted face-to-face with the participants. The goal of the semi-structured interviews was to give the participants the opportunity to discuss their experiences using technology as a developer of inclusive education. These interviews were conducted in English and Afrikaans, according to the language preference of the participant. The Afrikaans interviews were transcribed into English. Each interview lasted approximately 30-40 minutes. Interviews were conducted at times appropriate for the participants. A recorder was used, but only with the consent of the participant for the interview to be recorded and transcribed afterwards.

The researcher used her own reflective notes and observations during the interviews to determine participants' reactions and attitudes, which can be used in developing the final conclusions.

### 3.6.2 Participant observation

According to McMillan and Schumacher (2010:350), observation is a way for the researcher to see and hear what is occurring naturally in the research situation. A participant-observer is one who both observes and takes part in group activities.



*Figure 5: Ongoing assessment steps*

Source: Researcher's own figure

Data was recorded as field notes. These notes were dated, and the context identified.

### 3.7 Data analysis and interpretation

The collected data was analysed as follows: The various interviews and observation lists were analysed using content analysis. The results were then integrated to gain a deeper understanding of teachers' experiences with technology as a developer of inclusive education.

### **3.7.1 Content analysis**

After completion of the interviews, a direct transcription of the data was compiled. Content analysis was done. According to Nieuwenhuis (2016c: 111), content analysis can be defined as a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding.

Nieuwenhuis (2016c:112) explained that content analysis can be described as a useful technique to discover and describe content. The researcher also used participant classroom observation where the researcher interacted with the group being observed. The researcher conducted the observation by listening and seeing the teachers' strategies and approaches to assist learners who experience barriers and the challenges in the classroom environment when technology is used as a pedagogical tool. The data was recorded in writing in a notebook and filled out in more detail after the sessions.

The information gathered from the semi-structured interviews and participant observations was analysed by content. Coding was applied after the content was analysed. Nieuwenhuis (2016:116), defined coding as marking the segments of data with symbols, descriptive words, or unique identifying names. This coding enabled the researcher to understand the collected data in its entirety.

The qualitative analysis involved the following procedures:

- The direct transcripts were typed out and presented to the participants for verification.
- The full transcribed text and field notes were read to obtain an overall understanding of the content and context before coding took place.
- The transcribed text was sorted into meaningful themes and categories and subthemes and subcategories added to identify connections and relationships.
- The coding was evaluated for the relevance of the research objectives.

The use of content analysis provided the benefit of flexibility (Julien, 2008:121). Content analysis enabled the researcher to gain a better understanding of teachers' experiences using technology to develop inclusive education in Namibian schools.

### **3.8 Trustworthiness**

Trustworthiness is of utmost importance in qualitative research. According to Nieuwenhuis (2016: 123), assessing trustworthiness is the decisive test of data analysis, findings, and conclusions.

Guba (cited in Nieuwenhuis, 2016:123) proposes four criteria that he believes should be considered by qualitative researchers, namely credibility, transferability, dependability, and confirmability. Credibility refers to the congruency of the findings with reality and to ensure that the reader will believe any findings. In this research, the researcher used the semi-structured interviews with the participants and transcribed their exact words used during their interview. Afterwards, the researcher verified the content of each interview with each participant to make sure that they agreed with the content or to make the necessary changes. Transferability, according to Lincoln and Guba (cited in Nieuwenhuis 2016:124), should be the construct used in qualitative research. The researcher must give a full picture of the content and then allow the reader to determine whether the research is transferable to their content. Dependability is demonstrated through the research design and its implementation; the operational detail of data gathering; and the reflective appraisal of the project (Nieuwenhuis, 2016:124). In this study, the supervisor investigated the direct transcripts and interpretations to ensure that they reflected the participants' responses. Confirmability refers to the ability of the researcher to show that the data represents the participants' responses and not the researcher's own views (Cope, 2014: 89).

The researcher described how conclusions and interpretations were obtained and the findings were derived directly from the data collected.

### **3.9 Ethical considerations**

The researcher first applied for ethical clearance at the Ethics Committee (Faculty of Education, Ethics number: 2019/02/13/07157606/10/MC) prior to the start of the research. A letter was sent to the Dean of the Faculty to obtain permission to conduct the research.

In addition to obtaining approval from the Ethics Committee and the Dean of the faculty, according to Creswell (2009: 88), the following ethical requirements must be met in the proposed study:

### **3.9.1 Ethical issues in the research problem**

When identifying the research problem, it is important to identify a problem that would be beneficial to the individuals being studied (Creswell, 2009: 88). The problem investigated in this study must be meaningful. This study can be considered significant because it focuses on teachers' experiences of technology as a pedagogical tool. It will make teachers more positive to use technology in primary schools to teach in a manner that is based on what we know about the way learners learn in this new century and helping learners with learning barriers as well as catering for diversity in the classrooms.

### **3.9.2 Ethical issues in the purpose and questions**

According to Creswell (2009: 88), researchers must clearly convey the purpose of the study to the participants. Before the researcher obtained informed consent from the participants, the purpose of the study was clearly explained to the participants so that they did not become confused or misunderstand their involvement in the study (Creswell, 2008: 89).

### **3.9.3 Ethical issues in data collection**

According to Creswell (2009: 44), the researcher must draw up an informed letter of consent that the participants must sign before they participate in the proposed study.

According to Maree (2016: 44) there are essential ethical aspects, namely the question of confidentiality of the results and findings of the study as well as the protection of participants' identities. He emphasises the ethical importance of maintaining confidentiality (Maree, 2016: 44). For this reason, researchers must always strive to protect the identity of the participants to protect the participants from harm (Maree, 2016: 44). The following ethical requirements, highlighted by Van Wyk (2015: 572), were met in the study to ensure that the study was conducted in an

ethical manner: informed consent was obtained from the participants; participants were ensured of the confidentiality of all information and that their participation was voluntary; and participants were informed that they could withdraw from the study at any time.

In this study, participants could choose a day and time that was convenient for them. The researcher also obtained permission from the participants to make use of tape recorders. Tape recordings of the semi-structured interviews was not shared with any other person. The data will be stored safely, for a period of five years, in a locked cupboard/filing cabinet in the supervisor's office for future research or academic purposes; electronic information will be stored on a password protected computer.

#### **3.9.4 Ethical issues in data analysis and interpretation**

During the interviews, participants were guaranteed that their interviews would remain confidential (Creswell, 2008: 91). In this study, only the researcher and the supervisor had access to the information. The researcher also provided feedback on the findings of the study to the participants, if required. The participants were able to contact the researcher using the contact details provided on the informed consent letter.

#### **3.9.5 Ethical issues in writing and disseminating research**

The research should not use words or language that biases individuals against gender, ethnicity, or age (Creswell, 2009: 92). Researchers should also avoid the falsification of findings, since this is regarded as scientific misconduct (Creswell, 2009: 92). This study ensured that these guidelines were followed in the research as well as applied to reliable data and findings.

### **3.10 Conclusion**

In this chapter, a detailed discussion of the research design and methodology used, was provided. A qualitative approach is discussed in detail in this chapter, which defined and motivated the methodological purpose. The various aspects of the research design, such as methodology, paradigm, sample, methods of data

collection and data analysis were all described. Finally, aspects related to trust, dignity and ethics are discussed. Chapter 4 will focus on the analysis and interpretation of the data.

## **4. CHAPTER: ANALYSIS AND INTERPRETATION OF DATA**

### **4.1 Introduction**

This study was led by the following primary question:

In what ways did the teacher participants experience technology as a developer of inclusive education in primary schools in Namibia?

To fully investigate the primary question, the following secondary questions were addressed:

- What kind of perceptions do teachers have about technology and inclusive education?
- What are the challenges of using technology in the learning environment to develop inclusive education?
- How do technology and inclusive education complement each other?

Content reports were used to answer the above research questions. This chapter presents the analysis and the interpretation of the study.

### **4.2 Themes**

The research design was qualitative and aimed to determine whether technology is a developer of inclusive education. Findings were derived from transcription of audio recordings and further analysis of these written transcripts. The observations were done by listening to and seeing the teachers' strategies and approaches to assist learners who experience barriers and the challenges in the classroom environment when technology is used as a pedagogical tool.

Three main themes emerged from this research. This section looks at the questions that the interviewees were asked, and these are arranged under the three research questions as the 3 main themes identified (cf. Appendix I).

In each of the following sections, using direct quotes from the participants (cf. Appendix H) the exact question number is proposed to substantiate the

interpretation, for example (A1), where A indicates the participant, and 1, the question number of the semi-structured interview content analysis. In the section, the results and interpretation of the responses to the questions will be given. The results of the classroom observations are presented. The analysis and interpretation of the results are also discussed.

#### **4.2.1 Theme 1: The role of technology in developing inclusive education in Namibia**

##### **Type of learning environment**

Six of the nine participants consider their learning environments modern and technology-rich, as shown by the following statements: 'whiteboards, Apple TVs, iPads, flexible seating, using Google Classroom.' (cf. A1), 'have a lot of good and nice technology: Sphero robots, iPads, Apple TV, flexible seating.' (cf. B1), 'modern classroom with tablets, Apple TV, smartboard, Google Suite school.' (cf. C1), 'modern, TV, MP3-players, computer.' (cf. G1), 'modern, have a TV and a laptop.' (cf. H1), 'have a lot of tech: Proxima, whiteboards, laptop, MP3s.' (cf. I1)

A modern classroom environment with technology is needed to properly apply inclusive education. According to Norman (2016), technology provides tools that can help children to gain more independence to complete their work in the classroom and to feel more successful at school. As teachers, we need to prepare learners to learn for their future by providing them with an interest in lifelong learning and to motivate them to become autonomous users of digital technologies in the new century (Norman, 2016).

Six of the nine teachers recognise that a modern classroom environment is essential to prepare the new generation for the 21<sup>st</sup> century.

##### **Technology as a pedagogical tool**

All nine participants agree that technology should be used as a pedagogical tool in the inclusive classroom environment. This is evident from the following statements: 'we are teaching a new generation' (cf. A2, G2, I2), 'it is the way to go, technology

is everywhere, it is a powerful tool' (cf. F2), 'I am a fan of technology and a paperless classroom' (cf. C2), 'I am very enthusiastic as a teacher about it' (cf. B2), 'I can't think about educating without it' (cf. D2), 'we have to get more tech involved as part of teaching and learning' (cf. E2), 'a very good tool when used in an appropriate way' (cf. H2)

Teachers realise the importance of changing classroom practices to keep up with the digital realities of the modern era (Kale and Goh, 2012). They need to continue to adapt to the new landscape of education as the world is rapidly changing. Norman (2016) asserts that the future of the educational system is practically determined by the development of technology. According to Kale (2016), ICT is needed in education because the rapidly growing use of technology in today's world is pushing teachers to consider the integration of ICT into the classroom. From the point of view of teaching and learning, ICT can be defined as a purposeful tool which can boost students' capacity, productivity, and performance (Norman, 2016).

Worldwide, teachers will have to teach in a variety of ways and through various technologies to enhance their teaching practices, so that they become even more inclusive (Brewer, 2014).

The researcher found that all nine participants have a positive attitude about using technology as a pedagogical tool in the inclusive classroom of the 21<sup>st</sup> century. It must be used to promote learning and meet the new generation's needs and ways of learning, because the brain has not changed, but the way the brain learns has changed.

### **Teachers' beliefs about the compulsory use of technology in the classroom**

Six of the nine participants feel that it is essential for the 21<sup>st</sup> century. The participants' responses are evident from the following statements: 'it is the 21<sup>st</sup> century, essential to understand technology around you' (cf. A5), '21<sup>st</sup> century everything is automated' (cf. C5), 'necessary to help learners to become computer literate citizens' (cf. E5), 'new generation, new needs' (cf. G5), 'new generation, new century' (cf. H5), 'new tech generation, part of their interests' (cf. I5).

One of the nine participants feel that learners gain confidence through technology. This is evident from the following statement: 'kids gain confidence through it' (cf. F5).

One of the nine participants feel that technology shows progress. This is evident from the following statement: 'it shows progress, we use blogs to communicate with parents' (cf. B5).

Technology is the language of today's learners. As teachers, we have to embrace purposeful technology and help our learners gain confidence by exposing them to sharing and comparing their learning. Learners must be empowered to become the leaders of tomorrow. (Delzer, 2015).

Eight of the nine participants' responses are related to the literature. From these responses, it emerged that they are of the opinion that the use of technology should be compulsory as a pedagogical tool in the inclusive classroom and that teachers have to embrace the new and use technology purposefully.

### **Technology as a pedagogical tool affecting the learners' development and learning**

Four of the nine participants feel that technology affects learners' development. This is evident from the following statements: 'affects learners in a positive way' (cf. A8), 'they see how they progress, they create things' (cf. B8), 'increase self-awareness, learn to make plans and collaboration work' (cf. C8), 'gain confidence, has personal experiences and develop much faster' (cf. F8).

Five of the nine participants feel that technology affects learners' learning experience. This is evident from the following statements: 'I value tech, makes the impossible possible for learners, e.g. Skype' (cf. D8), 'learn much more, are more up to date with what is going on in the world' (cf. E8), 'especially for our visual learners, stimulating another sense' (cf. G8), 'unlocks learners' learning potential' (cf. H8), 'makes learning more effective and learn to work more independently' (cf. I8).

From the point of view of teaching and learning, ICT can be defined as a purposeful tool which can boost students' capacity, productivity, and performance. Technology will ensure that children will take a more active role in their learning (Norman, 2016).

From the above statements, it can be observed that all nine participants' responses are linked to the above literature extracts.

### **Kind of technology used to support learners with learning barriers**

All nine participants use technology to support learners who experience barriers to learning. This is evident from the following statements: 'I use the iPad to record, listen, take photos and videos to assist in their learning, especially visual learners' (cf. A13), 'I have a German learner with a communication barrier – I use the Spelling City app a lot' (cf. B13), 'I use iPads and Google Docs to support these learners' (cf. C13), 'App Store, find a lot of apps to help to differentiate and motivate these kids to keep going' (cf. D13), 'use C-pens, tablets, and YouTube videos to help them' (cf. E13), 'TV, YouTube videos, C-pens, whiteboards to help these learners' (cf. F13), 'assistive technology, e.g. pencil grips, seat cushions, and YouTube videos for gross motor development and brain breaks' (cf. G13), 'MP3 players as audiobooks to improve literacy' (cf. H13), 'software program, Audacity and MP3 players as a reader' (cf. I13).

Assistive technology has different options that can be used to help children with learning disabilities and learning problems. It is a broad concept covering virtually anything that might be used to compensate for lack of certain abilities (Reed & Bowser, 2005). Assistive technology is used to support an education programme in an inclusive classroom and learners are not expected to "keep up" but to "keep learning".

All nine participants use some form of technology to support learners who experience barriers to learning to reach their full potential and to feel more successful at school.

## **Teachers' experiences about technology complementing inclusive education**

The participants' views are evident from the following statements: 'tech makes it able to include everyone' (cf. A17), 'everyone in the class will benefit from using tech' (cf. F17), 'everyone in the class will benefit from using tech' (cf. C17).

Six of the nine participants agree that using technology in differentiated teaching absolutely complements inclusive education. This is evident from the following statements: 'tech makes it able to include everyone' (cf. A17), 'enjoy using tech because it benefits learning' (cf. C17), 'brings content to learners in different ways', 'satisfy all learning styles', 'everyone in the class will benefit from using tech' (cf. F17), 'complement learners who struggle more to understand better, stimulates more senses, which results in better learning' (cf. G17), 'support learners who experience barriers to help them reach their full potential' (cf. H17), 'we can support them better' (cf. I17).

Four of the nine participants agree that technology makes learning more accessible. This is evident from the following statements: 'it creates more learning opportunities' (cf. C17), 'tech is everywhere, can't think of myself as a teacher without it' (cf. D17), 'developing more software programs to complement inclusive education' (cf. E17).

Three of the nine participants agree that technology includes everyone and therefore complements inclusive education. "*Inclusion is the act of engaging people with disabilities in all daily activities – at school, at work, at home and in the community*" (Inclusion Network, 2006). Technology can help to transform the classroom from a classic teacher-centred experience to a student-centred experience (Hugo, 2014).

Six of the nine participants agree that differentiated teaching complements inclusive education. Tomlinson (2014) explains that teachers need a powerful and practical way to meet challenges that is both very modern and completely timeless, for example, how to divide their time, resources, and efforts to effectively instruct so large groups of students from diverse backgrounds and with varying levels of readiness, skill, and interests. Tomlinson (2014) explains that teachers have to use differentiated instruction to respond to the needs of all learners and to help every

unique learner to move toward greater knowledge, more advanced skills, and increased understanding.

Four of the nine participants agree that technology makes learning more accessible. Kale and Goh (2012) found that technology can be used as a tool for motivating students to learn in a different way, is effective and efficient, is dynamic and interactive, and it gives learners immediate access to more abundant source materials. All the participants agree that the use of technology in the learning environment complements inclusive education.

### **Participant Observation**

During the observation at school A, the researcher was able to observe a mathematics lesson on perimeters in a grade 2 class. The teacher began the class with a few instructions and reminders. The class consisted of 20 learners. The students had to divide themselves into two equal-sized groups, with an equal number of boys and girls in each group. The two groups were mixed ability and multicultural. Group 1 had to create a shape – a pentagon – by using a certain app on an iPad. The group members of group 1 had to subdivide their group into smaller groups, which had to perform different activities. Some had to do the measurement and others had to do the calculation. While the teacher was working with group 1, group 2 used a mathematics app on their iPads to play against each other to improve their calculation skills on certain levels.

Observing the classroom environment permitted the researcher to view the student's communication, collaboration, and critical thinking skills. It was a student-centred activity and not a teacher-centred one. The researcher noted the student's interaction and engagement with the group work activity. The researcher also noted that the students learnt from one another, especially the ones coming from more rural areas became more tech literate during the group work activity. They also learnt to work together, to make plans, to plan timeously, and to evaluate their performance. The online tools and apps helped the learners to engage in the group project. (Terronez, 2018) (Delzer, 2015; Maree, 2016; Van Wyk, 2015). Both group work activities created equal opportunities for everyone resulting in technology complementing inclusive education.

*“Education should be valued as a key social investment and a means to reduce inequality” (Government of the Republic of Namibia, 2011).*

During the observation at school B, the researcher was able to observe a mathematics lesson on carry over with three-digit numbers in a grade 3 class. The teacher began the class with a few instructions and reminders. She first introduced the lesson to the whole group by explaining on her whiteboard and showing a YouTube video song about the topic. After that, she divided the class of 11 learners into two groups. Group 1 consisted of a small group of 4 learners who have learning barriers, while the remaining 7 learners had to complete a worksheet with revision exercises. The teacher started to re-teach the lesson with group 1 first by using manipulatives, small whiteboards, and whiteboard markers to explain the concept of carry over with a three-digit number in the small group. After that, she demonstrated the lesson further by using a tablet with a mathematics app with the manipulatives to do calculations on their whiteboards. This was followed by a worksheet about the concept that had to be completed by group 1, while she started to introduce the same concept to group 2 in their group activity.

Observing the classroom environment, the researcher noted the interaction and communication in the student-to-teacher and student-to-student relationship. The researcher further noted that using technology makes the learners more enthusiastic about their work and what they are accomplishing. The students with learning barriers had the chance to work at their own pace and with room to make mistakes. By using multimedia elements, the teacher was able to vary the content delivery and supplement her lessons, resulting in improved comprehension. The main benefits for inclusive education for children with and without disabilities are that disabilities are tolerated, and fear and rejection are reduced. Additionally, it provides possibilities for unique relationships and the equality of being a member of the society (Chowdhury, 2011:4).

During the observation at school C, the researcher was able to observe a grade 1 class mathematics lesson on the relationship symbols greater than, smaller than, and equals. The teacher began the class with a few instructions and reminders. Differentiated teaching was used because of the diversity of the learners and their unique needs and learning styles. The class was divided into five smaller groups,

which rotated after fifteen minutes. They had to complete different activities about relationship symbols at each group work activity. The teacher used YouTube dance videos during the rotation of two groups to give the learners a “brain break” between the activities.

Observing the classroom environment, the researcher noted the interaction with peers and peer teaching during the group work activities, which increased the learners’ courage to keep on trying and to do certain activities. Presenting the content in different ways helped to satisfy different learning styles and facilitated deeper learning.

Children who tend to struggle more than others need to be taught in different ways to give them an opportunity to use different methods to show what they know (Chambers, 2017). During the YouTube dance videos, the researcher noted that the physical activity boosted the learners’ concentration levels and gross motor skills.

Teaching methods for inspiring the student of the future will be classroom conditions that are not static and spoil the eyes and which will make students feel more comfortable to learn (Ruhl, 2015). Eredics (2018) found that technology gives learners many opportunities to grow. Therefore, it is one of the tools which can be used to serve learners better and develop inclusive education. In an inclusive classroom, learners are not expected to “keep up” but to “keep learning”.

#### **4.2.2 Theme 2: Teachers’ perceptions of technology and inclusive education**

##### **Enhancement of technology in schools**

All nine of the participants see technology as a new means to meet the needs of a new generation. This is evident from the following statements: ‘it promotes their learning’ (cf. B7), ‘modern learners are much more visual’ (cf. C7), ‘teachers need to be on board’ (cf. D7), ‘so much you as a teacher can do with tech’ (cf. F7), ‘new generation, part of their interest, a new way of learning’ (cf. H7), ‘teaching a new generation, more visual learners, learn differently’ (cf. I7), ‘otherwise they will be far

behind in the 21<sup>st</sup> century' (cf. A7), '21<sup>st</sup> century, it is beneficial for children' (cf. B7), 'part of life, tech is everywhere' (cf. E7), 'part of future skills' (cf. G7).

What was good for the past was right for the past, it was right for that time but as teachers we must expect change as well as embrace it (Delzer, 2015). We cannot stay in a limited environment. In our inclusive classrooms is the future of every nation (Terronez, 2018). Not using technology will leave our children far behind the rest of the world. (Hugo, 2014:217).

Teachers need to continue to adapt to the new landscape of education as the world is rapidly changing. As teachers, we have to prepare learners for the future by providing them with an interest in lifelong learning and to motivate them to become autonomous in the new century (Kale and Gog, 2012).

All nine of the participants feel that we are teaching a new generation with new needs. The brain did not change, but the way the brain learns has changed. The future of each nation is in today's classrooms and we are preparing them to learn for the future.

It is evident from the above responses and literature that all nine participants agree that technology in schools needs to be enhanced as we teach a new diverse generation with new needs.

### **Teachers are comfortable using technology**

All nine participants' responses are related to this theme. This is evident from the following statements: 'yes, like to use it and to learn more about it' (cf. A3, I3, B3), 'feel absolutely comfortable when using it' (cf. C3, D3), 'I am trained and qualified to use it' (cf. E3, F3), 'I am a young teacher who enjoys to use it' (cf. F3, G3).

Worldwide, teachers will have to teach in a variety of ways and through various technologies to enhance their teaching practices, so that they become even more inclusive (Brewer, 2014). It is part of the undergraduate students' education, and teachers must be technologically competent to be able to teach this new generation more appropriately and to cater for diversity. The researcher understands from all

nine participants' responses that they feel comfortable using technology in the classroom and that they enjoy using technology in teaching and learning.

### **Support for learners who experience barriers to learning**

All nine participants view technology as a definite support for learners experiencing barriers to learning. This is evident from the following statements: 'alternative ways of helping kids to reach their potential' (cf. A11), 'listening to and looking at stories are an extension of the English language, using Google Translate services as well' (cf. B11), 'definitely a lot of apps and software programs available to support them' (cf. C11), 'absolutely, Duolingo language app, kids can learn any language' (cf. D11), 'yes, an untouched area' (cf. E11), 'yes, C-pens help learners to improve their working speed and increase marks' (cf. F11), 'absolutely, MP3 players develop language literacy' (cf. G11), 'yes, devices and software programs to help and support kids' (cf. H11), 'yes, a lot of devices and certain software programs give learners more choices in their learning to show their potential' (cf. I11).

It often appears that learners who experience academic problems often have a special ability with computers (or technical devices), which can help these learners to have an equal chance to feel academically successful in school (Belson, 2003, Hasselbring & Glaser, 2000, Raskind & Higgins, 1998). The effective use of technology in education has changed the face of education and it has created more educational opportunities (Ramey, 2013).

From the above responses and literature, it is evident that all nine participants view technology as a support for learners who experience barriers to learning.

### **Interactive teaching in the inclusive classroom**

All nine participants consider interactive learning an important component of teaching in an inclusive classroom. This is evident from the following statements: 'part of our requirements as a teacher' (cf. A12), 'the whole class teach – peer teaching, group teaching, individual teaching, rotations' (cf. B12), 'kids have to ask three kids first, before asking the teacher' (cf. C12), 'a lot of collaborative learning, more student-centred' (cf. D12), 'a lot of group work' (cf. E12), 'abstract concepts

need more interactive teaching' (cf. F12), 'small group teaching and differentiated teaching result in better consolidation of learning' (cf. G12), 'group work incorporates a lot of senses – better learning' (cf. H12), 'group work gives learners more choices' (cf. I12).

Teachers will have to respond to the needs of all learners. The outcome will be that each of the unique learners in the classroom will attain greater knowledge, more advanced skills, and increased understanding (Tomlinson, 2014). Eredics (2018) found that a healthy learning environment have to be maintained by teachers using strategies and being responsive to learners' needs. Teaching methods for inspiring the student of the future will be classroom conditions that are not static and spoil the eyes and which will make students feel more comfortable to learn (Ruhl, 2015).

All nine participants consider interactive teaching an important aspect to ensure that learning takes place and meets all learners' unique needs in an inclusive classroom.

### **Teachers' perceptions of inclusive education**

Four of the nine participants' responses are related to this theme. This is evident from the following statements: 'not for us to change the student, rather change the system' (cf. A14), 'mindset of teacher must change' (cf. B14), 'there are a lot of learners with unique needs' (cf. F14), 'classes must not be too big to accommodate inclusion' (cf. B14).

Three of the nine participants' responses are related to this theme. This is evident from the following statements: 'great concept' (cf. E14), 'an important intervention' (cf. F14), 'the way to go, new generation with a lot of diversity' (cf. C14).

Three of the nine participants link inclusivity to the principle that each learner has potential. This is evident from the following statements: 'appreciate different talents and learn from each other' (cf. D14), 'every child has an equal chance to show his/her potential' (cf. G14), 'everyone who is able to learn, must get the chance to do it' (cf. H14).

Four of the nine participants link inclusivity to the fact that the system must adapt to the learner and not the learner to the system.

A variety of teaching strategies are needed to give each learner the time and support to reach his or her full potential. As a result, the system needs to address the needs of the learner and that the individual is not expected to adapt to the system (Chambers, 2017).

Three of the nine participants link inclusivity to the principle that it is a great concept and an important intervention. The main benefits for inclusive education for children with and without disabilities are that disabilities are tolerated, and fear and rejection are reduced. Additionally, it provides possibilities for unique relationships and the equality of being a member of the society (Chowdhury, 2011:4). Teachers need to know how to help learners who experience barriers as will enable them to improve their quality of life.

Three of the nine participants link inclusivity to the fact that everyone has potential and is unique. Teachers also need to develop more abundant learning environments for those who have special educational needs, because every child is unique. Diversity in classrooms leads to the emergence of more individual learner needs, which means that the differences of all learners must be taken into account (Chambers, 2017). This requires schools to develop new ways of teaching to be able to cater for all, and to ensure that all children benefit, regardless of their physical, learning or any other disability, social status, or gender.

From the above responses and literature, it is evident that all nine participants have a positive perception of inclusivity and that they consider it an important component of the school system of the 21<sup>st</sup> century.

### **Learning environment supporting inclusive education**

Five of the nine participants' responses to this question indicate that they use interactive teaching to support inclusivity. This is evident from the following statements: 'flexible seating, students have choices, mixed ability interaction' (cf. A15), 'learning environment is interactive and practical' (cf. E15), " pair work, small classes, peer teaching' (cf. F15), 'differentiated teaching to support different learning styles, mini lessons' (cf. G15), 're-teaching, mixed ability teaching, peer teaching' (cf. H15).

Interactive learning, which means finding ways to activate many parts of the brain while learning, is very effective for inclusive education purposes and will make it possible for children who underperform in certain areas to excel in ways they never thought would be possible (Hugo, 2014). Worldwide, teachers will have to teach in a variety of ways and through various technologies to enhance their teaching practices, so that they become even more inclusive (Brewer, 2014).

The researcher found that five of the nine participants agree that an interactive learning environment supports and promotes inclusivity.

### **Enhancement of inclusive education in schools**

Six of the nine participants agree with the statement that more training regarding the topic is necessary. This is evident from the following statements: 'more workshops are needed' (cf. B16), 'more training around the topic is needed' (cf. E16), 'teachers need more training' (cf. G16), 'more training for teachers about the topic' (cf. H16), 'give them appropriate training' (cf. I16), 'teachers should be trained, subject for graduates' (cf. F16).

Four of the nine participants agree with the statement that teachers need to change their thinking about inclusive education. This is evident from the following statements: 'focus more on learners' strengths, make room for mistakes, encourage kids to keep on trying' (cf. A16), 'change the minds of teachers' (cf. B16), 'more holistic approach, mind shift, value every child the way they are' (cf. D16), 'make teachers more aware about it' (cf. I16).

Six of the nine participants agree that teachers need more training about inclusion. Teachers need to continue to adapt to the new landscape of education as the world is rapidly changing (Kale and Goh, 2012). This requires schools to develop new ways of teaching to be able to cater for all, and to ensure that all children benefit, regardless of their physical, learning or any other disability, social status, or gender.

The modern classroom is more diverse and more inclusive than ever before with much greater potential to implement technology. Teachers will have to address the needs of all learners. The outcome will be that each of the unique learners in the

classroom will attain greater knowledge, more advanced skills, and increased understanding (Tomlinson, 2014).

The researcher found that four participants are clearly convinced that they need to change their mind sets to see each learner's uniqueness and to meet each one's unique needs.

The main benefits for inclusive education for children with and without disabilities are that disabilities are tolerated, and fear and rejection are reduced. Additionally, it provides possibilities for unique relationships and the equality of being a member of the society (Chowdhury, 2011:4).

All nine of the participants agree that inclusive education must be enhanced in schools because we are living in a diverse world and inclusive education has wide implications for inclusion in our society at large.

#### **4.2.3 Theme 3: Challenges of using technology in developing inclusive education**

##### **Appropriate training in using technology.**

Four of the nine teachers have a Tech coach at their school where they receive frequent training on the latest software programs and new applications. This is evident from the following statement: 'we have a Tech coach at school' (cf. A4, B4, C4, D4).

One of the nine teachers is a Microsoft Office specialist and trains the other teachers at their school as well. This is evident from the following statement: 'qualified as a Microsoft Office specialist' (cf. E4).

One of the nine teachers did a post graduate course in Technology. This is evident from the following statement: 'did a post graduate course in Technology' (cf. F4).

Two of the nine teachers had appropriate training in using technology as part of their pre-graduate degree requirements. This is evident from the following

statements: 'was a subject, part of my degree' (cf. G4), 'had it as a subject when I was at university' (cf. H4).

Four of the nine participants are trained continually by their school's own Tech coach who makes sure they remain up to date with the latest technology and how to use it as a pedagogical tool in the classroom. ICT should be integrated with teaching and learning in the classroom. According to Kale and Goh (2012) many schools have only started to realise its true potential.

One of the nine participants did a postgraduate qualification to empower himself regarding technology.

One of the nine participants is a trained Microsoft Office specialist who provides training to the other teachers at the school. Teachers recognise the importance of changing classroom practices to keep up with the digital realities of the modern era (Kale and Goh, 2012).

Two of the nine participants are young teachers trained in the use of technology as a requirement in their training as teachers at their respective universities.

From the responses, it is evident that all eight participants are very comfortable with the use of technology and know that they have to empower themselves on a regular basis because of technology changing frequently.

### **Challenges experienced by teachers in using technology in the inclusive classroom.**

All nine participants face challenges in using technology in the classroom. This is evident from the following statements: 'Wi-Fi sometimes very slow, interruption in connection' (cf. A9), 'electricity failures' (cf. B9), 'have to re-teach some basic tech skills to certain learners' (cf. C9), 'influx of information and knowledge, some tools not user-friendly' (cf. D9), 'some kids are not on the same tech level, need more attention to keep up' (cf. E9), 'Wi-Fi problems' (cf. F9), 'TV screen is too small' (cf. G9), 'Wi-Fi challenges' (cf. H9), 'not enough devices, learners have to share' (cf. I9).

Norman (2016) highlights that the future of the educational system is practically determined by the development of technology. Schools that wish to move with the times cannot remain in a confined environment and need to stay open to change. We know that tech enables growth and therefore governments will need to assist schools with the integration of ICT into the classroom (Kale and Goh, 2012).

From the statements, it is evident that all nine participants experience challenges in using technology in the classroom and that it is important to create networks that provide effective access to information using ICT for teachers and learners.

Most of the participants are familiar with different types of devices for learners who experience barriers. This is evident from the following statements: 'speech-to-text, text-to-speech' (cf. A10), 'audiobooks, Siri, alternative assessments, support system devices' (cf. C10), 'a lot of apps and software programs to differentiate your learning for everyone in your class' (cf. D10), 'C-pens helping kids who struggle with reading problems' (cf. F10), 'MP3s, audiobooks, tablets, pencil grips, seat cushions, printing worksheets and assessments in bigger font' (cf. G10, H10), 'Dictaphones, cell phones, free software recording programs, Audacity' (cf. I10).

Learning difficulties and learning disabilities prevent many children from progressing at school (Brewer, 2014). Assistive technology (AT) refers to any tool that can be used to support learning and interaction to help learners who experience barriers of some kind. It does not change what the child is learning, instead it makes it possible for a child to work around challenges and contributes to the quality of their lives (Chambers, 2017).

From the statements above it is evident that all nine participants support the above literature and are aware of various assistive technologies that can help learners to work around challenges in the classroom.

### **Additions or changes regarding technology in the inclusive classroom**

All nine participants would like to use more and newer technology in their classrooms to promote learning. This is evident from the following statements: 'more virtual tours to prepare learners to interact more globally' (cf. A6), 'more technology,

more independent working' (cf. B6), 'more practical cloud-based storage system' (cf. C6), 'a tablet for every child' (cf. D6), 'more modern and newer tech, every child has his/her own tablet' (cf. E6), 'more modern tech' (cf. F6), 'add more modern tech (cf. G5), 'would like to have reading programs and Proxima's to show YouTube videos' (cf. H5), 'would like to add more technology' (cf. I6).

Hugo (2014:217) found that technology has transformed our lives immensely over the past few years, and it is essential that we make use of technological advances in our approach to our children's education. Teachers recognise the importance of changing classroom practices to keep up with the digital realities of the modern era (Kale and Goh, 2012).

These responses from the participants indicated to the researcher that all nine would like to make use of more and newer technology in their classrooms as they now recognise the importance of technology in the learning environment of schools in the 21<sup>st</sup> century.

### **Participant Observation**

During the observation at school B and C the researcher noted a few challenges faced in the classroom in using technology. The classroom was smaller than usual and had limited space to enable the teacher to create a modern classroom layout. Another challenge noted was the limited number of devices, e.g. learners had to share tablets. This challenge made personalised learning difficult as well as affecting learners' motivation. At school C, the layout of the classroom was not modern and needed improvement to create space to use technology appropriately. More technology devices need to be used as part of the group work activity to make differentiated teaching more effective and provide opportunities for learners to grow and to feel more enthusiastic about their work

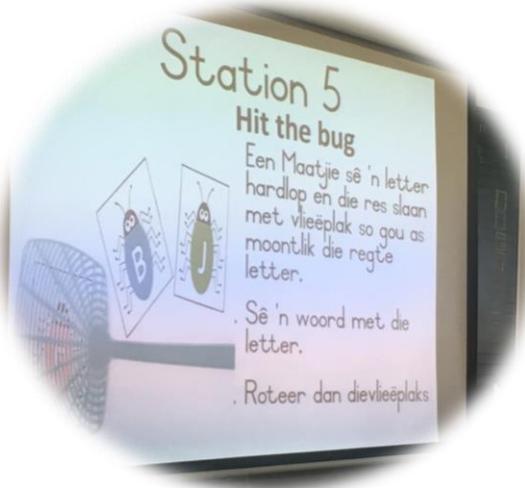
### **4.3 Conclusion**

It is evident from the responses that technology has the potential to change the way teachers teach, learners learn, and contributes to the development of inclusive education. All the teachers were familiar with technology and were able to use it as

a pedagogical tool in the classroom. The challenges faced in the classroom in using technology were mostly the layout of the classrooms, the limited number of technology devices, as well as a lack of sufficient space to use technology devices. Another challenge was that not all the teachers were familiar with all the different technology devices and the possibilities these offer for teaching and learning in the inclusive classroom.

In chapter 5, the researcher provides a conclusion of this research study by emphasising the research findings and discussing some recommendations.

**4.4 Images of inclusive classrooms in primary schools of Namibia in the Khomas region:**



## **5. CHAPTER: CONCLUSION**

### **5.1 Introduction**

This chapter provides an overview of the study and addresses the research questions. The possible limitations of the study are also investigated. Finally, the researcher provides recommendations for further research and a general conclusion of this study.

### **5.2 Summary of the study**

The purpose of chapter 1 is to inform the reader about the objectives of the study as well as the research design used in the study. First, several concepts are explored. An in-depth discussion of the background to the problem statement and research problem are then provided followed by the questions and goals of the research study. This chapter also elucidates the research design and the methods and processes employed in the research study. In conclusion, the rest of the chapters included in this research study are outlined. Chapter 2 offers an overview of the literature. Focusing mainly on the literature on technology and inclusive education, the chapter consists of the following elements: Teachers' experiences (cf. 2.2), technology (cf. 2.2.1), inclusive education (cf. 2.3), and the modern interactive classroom (cf. 2.4).

In chapter 3 the focus is on the research design, methods, and processes used in this research study. It includes a description of the qualitative research design which consisted of a multiple case study and research methodology that complements interpretivism. The researcher also describes the sample, research environment, data collection methods, and data analysis methods. Nine primary school teachers from three technology-rich schools voluntarily participated in this study. The data generated by them was analysed using content analysis. The chapter is concluded with a discussion of the requirements of trustworthiness and ethical issues which were met by this study.

Chapter 4 presents the analysis and interpretation of the data that was collected through semi-structured interviews and classroom observations. The researcher also presents an explanation of the findings. The semi-structured interviews

focused on the participants' experiences with technology and its use in inclusive education. Classroom observations focused on the participants' implementation of technology to promote inclusivity in teaching and learning to identify the challenges experienced in using technology in the classroom.

### **5.3 Findings of the study**

The study indicated that teachers' experiences of technology in the classroom contribute to the development of inclusive education. Teachers agree that inclusive education must be enhanced in schools as we live in a diverse world which has extensive implications for inclusion in our society at large.

From the experiences of primary school teachers, it emerged that technology is an excellent tool that can be effectively used to develop and promote inclusivity. The implementation of technology to meet learners' unique needs and different learning styles will encourage children to learn and participate more in the learning process. In addition, the study determined that using multimedia and software programs to present content differently makes a huge difference in each child's life and allows the learners to feel more successful at school. From the participants' experiences it could be concluded that technology promotes inclusiveness and contributes to its development. It was also found that teachers were comfortable with the use of technology but would like to have more training in this regard. The semi-structured interviews conducted with the teachers also identified the concept of inclusivity as another aspect in which they required further training to be able to realise learners' potential and to teach them in the best possible way. The study further indicated that teachers need to enhance diversity as this will allow educators to become better equipped to teach a new generation with new needs.

The 21<sup>st</sup> century teacher with the right approach who can make a mind shift to using technology to meet learners' unique needs will be able to make a huge difference in each child's life and in the community at large. Technology when used as a pedagogical tool in the classroom, delivers many benefits for the development of inclusive education. From primary school teachers' experiences, it emerged that technology is a tool which is still underutilised. This tool, which allows on to vary

content delivery, has the power to clarify concepts for every student and can contribute to the inclusion of all learners by supporting learners with learning barriers.

Technology is seen as a means to a goal to influence learners' development and learning experience. According to the participants, technology is a useful tool which could boost student performance and make learning more enjoyable and accessible. The use of technology also helps to create a teaching environment that is not static, makes students feel more comfortable to learn, and provides opportunities for learners to grow and feel more enthusiastic about their work.

It was found that when technology is used in the learning environment, various challenges are encountered. For this reason, teachers need to be continually trained to remain knowledgeable of the latest education technology to meet each learner's unique needs. To use technology effectively; teachers need better preparation, training, and development. The learning environment must also be sufficiently equipped with modern tools so that technology can be effectively harnessed. The research further highlighted several other challenges that some of the teachers in Namibian schools face. These include, inaccessible infrastructure and lack of access to appropriate teaching and learning technologies.

This study also found inclusive education to be an important intervention. Two important principles that were highlighted are that *the teacher should not try to change the child; but instead, the system should adapt to the child*, and that *teachers must value each child the way they are and everyone who is able to learn, must be given the chance to do so*. Teachers need specific training to use assistive devices effectively. They should also receive training on how to source these and other materials. In addition, they need guidance in adapting their lesson plans to ensure that all learners are accommodated. They must also modify their classroom layout and teaching strategies to become more inclusive.

The results obtained from the various interviews indicate that the primary school teachers realise that to bring potential to reality in an inclusive classroom will require appropriate skills and knowledge. This again confirms the need for more training in this regard. Teachers indicated that they did not always have the specific

proficiencies and knowledge required to teach some of the learners with specific disabilities, for example dyslexia. They need more specialised knowledge or competence to assess, diagnose, and/or teach learners with disabilities. Additional in-service training was shown to be necessary to help teachers to address the needs of the children who are already in their classrooms.

Most of the participants believed that technology makes the impossible possible and that it can be harnessed to improve and transform teaching in a way that will benefit weaker learners specifically, as well as learners from rural and urban areas who only have access to technology at their schools. All participants agreed that a positive attitude towards learners with disabilities is the most important characteristic for a teacher to be effective. Only once teachers become conscious of their own perceptions of learning will they be able to effectively support their learners in the inclusive classroom. This is because *how* learners learn is at least as important as *what* they learn. Primary school teachers have come to the realisation that they cannot remain in a limited environment and have to help students to prepare for the future. By using technology to enable growth and develop through inclusive education practices they can prepare students for a future in a diverse world. Using technology will also help students to deal with ongoing technological change in their society and workplace after they graduate from school (Noss, 2012).

All schools need to have access to the internet, computers, and assistive technologies. It will assist teachers to conduct their own research, while learners will also benefit from the opportunities that technology provides. It is the responsibility of both the government and schools to provide an enabling environment. In addition to this, the use of technology in the primary schools of Namibia as well as the development of inclusive education by using this technology should be enforced.

#### **5.4 Limitations of the study**

This research provided insight into teachers' experiences of technology as a developer of inclusive education; there were, however, a few limitations to the study. These include:

- Lack of time. The researcher had a limited amount of time to complete her studies, which means data may not be as rich.
- This study is limited to primary school teachers.
- The number of technology-rich primary schools in Namibia is limited.
- In terms of the implementation of technology to develop inclusive education practices, the three technology-rich schools are not on the same level .
- The research is limited to one region of Namibia.

### **5.5 Recommendations for future research**

Using more participants from other technology-rich schools in Namibia could help gain a better understanding of teachers' particular experiences. The same study could also be done in high schools. Further research could be done in a greater number of schools in different regions of Namibia. The researcher also believes that models should be developed to prepare and assist teachers to modify the layout of an inclusive classroom environment and to provide an idea of what a 21<sup>st</sup> century classroom might look like because we know that environment affects achievement.

### **5.6 Conclusion**

Chapter 5 provides a summary of the study. It also outlines the main features of each chapter as well as the findings and recommendations of this study.

In conclusion of this chapter, the researcher would like to leave a final thought with a quote from George Couros, *“Technology will not replace great teachers but technology in the hands of great teachers can be transformational.”*

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## **APPENDIX A: PARTICIPANT INFORMATION SHEET**

Date: \_\_\_\_\_

**Title: The changing roles of Foundation Phase teachers in Namibia: Teachers' perceptions**

### **DEAR PROSPECTIVE PARTICIPANT**

My name is Zelda van Wyk and I am doing research under the supervision of Prof S. Ntombela, a professor in the Department of Inclusive Education, towards a Master of Education at the University of South Africa. We are inviting you to participate in a study entitled: The changing roles of foundation phase teachers in Namibia: Teachers' perceptions.

### **WHAT IS THE PURPOSE OF THE STUDY?**

This study is expected to collect important information that could make teachers more aware of the changes in their roles and of the way in which these changing roles complement each other in the teaching environment. This will benefit the education industry by making teachers more positive about using technology in the foundation phase to teach in a way that is based on what we know about the way learners learn in this new century and helping learners with special needs as well as catering for diversity in their classrooms. It will also be a direct contributor to the understanding of the client in this industry, as the educational industry is much more sensitive to changes than it was 20 years ago.

This study will also enrich the readers with a new perspective of being a teacher in the foundation phase.

### **WHY AM I BEING INVITED TO PARTICIPATE?**

You are invited because you are a teacher in the foundation phase within Namibia, selected by me. I obtained your contact details from the reception at your school.

**WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?**

The study involves a semi-structured interview whereby I will write down your responses as well as tape-record them. The questions to be asked are the ones shown in the document I just gave you, but you might be requested to kindly elaborate on certain responses. Approximately 1 hour will be needed for the interview.

**CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?**

Participating in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason.

**WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?**

As I mentioned in the purpose of the study, the education industry, teaching staff, parents, learners, and the society at large will benefit through gaining vital knowledge to better understand teachers' changing roles in the foundation phase in Namibian schools, which will equip them better to serve their learners. It also may redirect the approach of teaching in this new era.

**ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?**

The potential harm which might occur is that some people might think that your participation in the research is to expose teachers' incompetency in fulfilling their changing roles, but be assured that all your responses will be kept confidential. The Ministry of Education of Namibia is also aware of this research and has approved it.

**WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?**

You have the right to insist that your name not be recorded anywhere and that no one, apart from the researcher and identified members of the research team, will know about your involvement in this research.

Your answers may be reviewed by people responsible for making sure that research is done properly, including the transcriber, external coder, and members of the Research Ethics Review Committee, in which case a confidentiality agreement will be signed. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

However, your anonymous data may be used for other purposes, such as research reporting, journal articles, and/or conference proceedings. Privacy will be protected in any publication of the information and individual participants will not be identifiable in such reports.

**HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?**

Hard copies of your answers will be stored by the researcher for a period of five years in a locked cupboard/filing cabinet in the supervisor’s office for future research or academic purposes; electronic information will be stored on a password-protected computer. Future use of the stored data will be subject to further Research Ethics Review and approval, if applicable. Where necessary, hardcopies will be destroyed permanently by shredding or burning them, and electronic copies will be deleted permanently from the hard drive of the computer using a relevant software program.

**WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATION IN THIS STUDY?**

There is no payment or incentives for participating in this study.

**HAS THE STUDY RECEIVED ETHICS APPROVAL?**

This study has received written approval from the Research Ethics Review Committee of the College of Education, UNISA, a copy of the approval letter may be obtained from the researcher if you so wish.

**HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?**

If you would like to be informed of the final research findings, please contact Zelda van Wyk on (+264811242575) or email at: [zvanwyk@mweb.com.na](mailto:zvanwyk@mweb.com.na). The findings are accessible for five years. Should you require any further information or want to contact the researcher about any aspect of the study, please contact \_\_\_\_\_(insert principal research contact details here, including email, internal phone number and fax number).

Should you have concerns about the way in which the research has been conducted, you may contact Prof. S. Ntombela on 0124812881 or email at: [ntombs@unisa.ac.za](mailto:ntombs@unisa.ac.za).

Thank you for taking the time to read this information sheet and for participating in this study.

Thank you

\_\_\_\_\_  
Zelda van Wyk

## APPENDIX B: LETTER OF CONSENT

### CONSENT/ASSENT TO PARTICIPATE IN THIS STUDY (Return slip)

I, \_\_\_\_\_ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits, and anticipated inconvenience of participation.

I have read (or had explained to me) and understand the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications, and/or conference proceedings, but my participation will be kept confidential, unless otherwise specified.

I agree to the recording of the interview.

I have received a signed copy of the informed consent agreement.

Participant's Name and Surname (please print) \_\_\_\_\_

\_\_\_\_\_

Participant's Signature

\_\_\_\_\_

Date

Researcher's Name & Surname (please print) \_\_\_\_\_

\_\_\_\_\_

Researcher's Signature

\_\_\_\_\_

Date

**APPENDIX C: CONFIDENTIALITY AGREEMENT**

You have been hired to transcribe/externally code for Zelda van Wyk, on the research project: **The changing roles of Foundation Phase teachers in Namibia: Teachers' perceptions**

The ethical guidelines of this study require that you read and sign this form, signifying that you are willing to enter into a confidentiality agreement with respect to the data collected in this study.

The audio recordings you will receive will likely contain identifying markers of the participants as well as names of third parties (for instance, colleagues, family members, and/or acquaintances of participants). In order to protect confidentiality, you are to remove all identifiers of third parties and of participants who wish to remain anonymous. Materials may never be left unattended, and must always be secured. By signing below, you agree not to reveal any information about what is contained in the audio recordings or written transcripts. Furthermore, you agree not to discuss anything regarding the participants or the data collected in this study with anyone other than the principal researchers.

By signing below, you are indicating that you have read and understand the above agreement and that you will follow all the specified conditions.

Name: \_\_\_\_\_

Contact telephone: \_\_\_\_\_

Email address: \_\_\_\_\_

Signature: \_\_\_\_\_

## APPENDIX D: INTERVIEW QUESTIONS FOR TEACHERS

Date: \_\_\_\_\_

My name is Zelda van Wyk, a student researcher at UNISA under the supervision of Prof. S. Ntombela. I am studying towards a Masters of Education in Inclusive Education.

As per our appointment, I have come to interview you on the research: Teachers' experiences of technology as a developer of inclusive education in primary schools of Namibia. I will take notes as well as record the interview and, as I mentioned in the consent form, everything will be kept confidential.

### BACKGROUND INFORMATION

- **Tell me a little about yourself**
  - Name?
  - Age?
- **Tell me, how you became a teacher**
  - Profession? Studies?
  - How long have you worked as a teacher?
  - Have you participated in any teaching courses or training after your graduation?
  - What motivates you in being a teacher?
  - Are you happy about being a teacher?
- **Tell me about your current job?**

- What grade do you teach?
- What kind of students do you have in your class?
- How big is your school – classes, teachers, learners?

## QUESTIONS

1. Tell me about your learning environment. Is it modern?
2. What do you think about using technology as a pedagogical tool?
3. Are you comfortable using technology?
4. Did you have appropriate training in using technology?
5. Must technology be compulsory in the class situation? Why or why not?
6. What would you add or change in your class regarding technology?
7. Do you think technology should be enhanced in schools? Why or why not?
8. Tell me, do you think that using technology as a pedagogical tool affects the learners' development and learning experience?
9. What challenges do you experience in using technology in your classroom?
10. Do you know about different technology devices for learners who experience barriers?
11. Do you think learners who experience barriers to learning can be supported through technology?
12. Do you make use of interactive teaching?
13. What kind of technology are you using to support children who experience learning barriers?
14. How do you perceive inclusive education?
15. How does your learning environment support inclusive education?
16. What do you think should be done to enhance inclusive education in schools?
17. What challenges do you experience in using technology in your classroom?
18. Considering the experience, you have, can you say technology complements inclusive education? Why?

Thank you for the valuable information. Is there anything else you would like to add before we end?



**APPENDIX E: OBSERVATION SCHEDULE**

CHALLENGES FACED IN THE CLASSROOM IN USING TECHNOLOGY	OBSERVED	COMMENTS
Easy internet access		
Modern classroom layout		
Technology-rich classroom		
Learners are familiar with technology		
Learners are able to use technology		
Learners are literate in English		
Teachers are familiar with different technology devices		
Teachers are able to use technology as a tool		
Classroom has sufficient space to use technology devices		

## APPENDIX F: LETTER TO PRINCIPALS

Date: \_\_\_\_\_

School: \_\_\_\_\_

Dear Mr/Mrs \_\_\_\_\_

My name is Zelda van Wyk, a student researcher at UNISA under the supervision of Prof S. Ntombela. I am studying towards a Masters of Education in Inclusive Education.

The title of my research is: Teachers' experiences of technology as a developer of inclusive education in primary schools of Namibia.

I am in the process of obtaining information about technology-rich primary schools in Namibia. In my search for schools, your school has been mentioned as being one of those in Namibia that uses technology in the classroom. As my thesis specifically focuses on technology in the learning environment, I would like to learn more about the technology your teachers use as a pedagogical tool in their classrooms.

I therefore take the liberty of asking if you can indicate to me, by return mail, which technology the teachers are using in their classrooms. This will enable me to set up an appointment with your school.

Please feel free to contact the undersigned at 0811242575, should you need any more information.

Kind regards



Zelda van Wyk

## **APPENDIX G: REQUEST FOR PERMISSION TO DO OBSERVATION**

Date

The Principal

School

**Dear Mr/Mrs**

I am doing a master's in education at the University of South Africa and will be doing research in fulfilment of the requirements for this degree.

My study is focusing on how teachers use ICT to promote inclusive education and I will be observing them teach.

Since my observations will be classroom-based, I am requesting permission from the parents to observe lessons where their children will be in class.

Yours sincerely

Zelda van Wyk

UNISA Master of Education, Student researcher

## APPENDIX H: SEMI-STRUCTURED INTERVIEWS: CONTENT ANALYSIS

### 1. Tell me about your learning environment. Is it modern?

Participants									Theme
A	B	C	D	E	F	G	H	I	Technology-rich schools.
“Consider it <b>modern:</b> whiteboard, Apple TV, iPads, flexible seating, Google Classroom.”	“Yes, have a lot of <b>good and nice technology:</b> tablets, Apple TV, flexible seating, Sphero robots.”	“Yes, <b>modern,</b> have tablets, Apple TV, whiteboards, Google Suite school.”	“Moderate, but still using traditional methods, can’t do away with it.”	“It’s ok, but need improvement, still big gaps.”	“It’s ok, but the classroom space is limited.”	“Yes, <b>modern,</b> TV, computer, MP3s.”	“Yes, <b>modern:</b> TV, laptops.”	“Yes, <b>modern,</b> <b>have a lot of tech.</b> ”	

2. What do you think about using technology as a pedagogical tool?

Participants									Theme
A	B	C	D	E	F	G	H	I	Teachers are comfortable using technology.
<p>“Great, appropriate for this tech generation. Essential for 21<sup>st</sup> century, necessary skills for learners.”</p>	<p>“Great. Everything goes into technology. Enthusiastic as a teacher about it. Privilege to be able to use it as a tool.”</p>	<p>“A fan of technology and a paperless classroom, no physical textbooks.”</p>	<p>“Absolutely, can’t think about education without tech, but balance is important.”</p>	<p>“Definitely, we have to get tech more involved as part of teaching and learning.”</p>	<p>“Definitely the way to go. Tech is everywhere. A very powerful tool.”</p>	<p>“Very important because we are teaching a new generation.”</p>	<p>“Yes, a very good tool when used in an appropriate way.”</p>	<p>Yes, helps me a lot, learners love it, they know a lot about tech – new generation.”</p>	

3. Are you comfortable using technology?

Participants									Theme
A	B	C	D	E	F	G	H	I	
“Yes, like to use it, goal for myself to learn more about it.”	“Yes, use it in my own house, I am also willing to learn.”	“Yes, absolutely comfortable, love it.”	“Very comfortable and willing to learn more.”	“Yes, trained and qualified to use it.”	“Yes, post graduate studies helped me a lot.”	“Absolutely, I am a young teacher, enjoy it.”	“Yes, I am a young teacher, love tech.”	“Yes, love to use it and like to learn more and more about it.”	Technology as a pedagogical tool.

4. Did you have appropriate training in using technology?

Participants									Theme
A	B	C	D	E	F	G	H	I	Appropriate training.
<p>“Yes, our Tech coach helps us a lot. Good support system. We get a lot of in-house training.”</p>	<p>“Yes, we have a Tech coach at school, trains us with new apps and I investigate it myself too.”</p>	<p>“Yes, started a few years ago with Google Drive, using the internet to train myself, and we have our own Tech coach at school.”</p>	<p>“Yes, we have a lot of support, we have our own primary ICT teacher.”</p>	<p>“Yes, I am qualified as a Microsoft Office specialist.”</p>	<p>“Yes, did a post graduate course in Technology.”</p>	<p>“Yes, was a subject - part of my education degree.”</p>	<p>“Yes, had it as a subject when I was at university.”</p>	<p>“Yes, had moderate training, would like more training in it.”</p>	

5. Must technology be compulsory in the class situation? Why or why not?

Participants									Theme
A	B	C	D	E	F	G	H	I	Essential for the 21 <sup>st</sup> century.
<p>“Yes, it is the 21<sup>st</sup> century. We can’t move back. Essential to understand technology around you.”</p>	<p>“As a school, we must, it shows progress, we use blogs to communicate with parents. Young children are very comfortable using technology.”</p>	<p>“Should be, 21<sup>st</sup> century, everything is automated, digital age. If you can’t use it, you will stay behind.”</p>	<p>“Not compulsory, but relevant and to be provided to learners.”</p>	<p>“Yes, ICT as a subject is necessary to help learners to become computer literate citizens.”</p>	<p>“Yes, for sure, kids gain confidence through it.”</p>	<p>“If your school has the necessary finance, it is a must-have, new generation, new needs.”</p>	<p>“Yes, we are teaching a new generation and have to prepare them for the new century.”</p>	<p>“Yes, we are teaching a new generation, the tech generation, part of their interests.”</p>	

6. What would you add or change in your class regarding technology?

Participants									Theme
A	B	C	D	E	F	G	H	I	Teachers needs regarding technology in the class room.
<p>“Adding something, like a more global audience, preparing kids to interact more globally, and virtual tours.”</p>	<p>“I would like to have more technology, e.g. tablets, more for independent working as well.”</p>	<p>“Add something, like Seesaw, having more tablets, more practical cloud-based system.”</p>	<p>“Tablets for every child, Apple TV to project info.”</p>	<p>“More modern and newer tech, e.g. smartboards, every child has his/her own tablet.”</p>	<p>“More modern tech, e.g. smartboards, each learner has his/her own tablet, own device.”</p>	<p>“Add more modern tech, e.g. whiteboards, smartboards, tablets.”</p>	<p>“I would like to have reading programs in the classroom as well as a Proxima to show slides, YouTube videos.”</p>	<p>“To get more training in the use of different devices and would like to add more modern technology.”</p>	

7. Do you think technology should be enhanced in schools? Why or why not?

Participants									Theme
A	B	C	D	E	F	G	H	I	New generation, new needs.
<p>“Yes, otherwise they will be far behind in the 21<sup>st</sup> century. Technology is everywhere.”</p>	<p>“Yes, 21<sup>st</sup> century, beneficial for children, it promotes their learning.”</p>	<p>“Yes, easier to learn, to teach a concept, modern learner is a much more visual learner.”</p>	<p>“Yes, parents and teachers need to be on board, need to have an ICT curriculum. Appropriate level of ICT for learners age.”</p>	<p>“Yes, part of life, need to equip learners. Technology is everywhere.”</p>	<p>“Yes, so much that you as a teacher can do with tech, it is underutilised.”</p>	<p>“Yes, part of future skills, have to use it actively in the learning environment.”</p>	<p>“Yes, as teaching a new generation, it is part of their interest, a new way of learning.”</p>	<p>“Yes, definitely, teaching a new generation, more visual learners, learn differently.”</p>	

8. Tell me, do you think that using technology as a pedagogical tool affects the learners' development and learning experience?

Participants									Theme
A	B	C	D	E	F	G	H	I	
<p>"It does. A lot of resources are now available that affect learners in a positive way."</p>	<p>"In a positive way, it extends their learning, they see how they progress, they create their own learning."</p>	<p>"Yes, instant feedback increases self-awareness, learners learn to make plans, observe, collaborate work."</p>	<p>"Definitely, depends on how well the teacher believes in it, is proficient, and has faith in it. I value it, tech makes the impossible possible."</p>	<p>"Yes, kids learn much more and they are more up to date with what is going on in the world."</p>	<p>"Yes, they gain confidence, have personal experiences, and develop much faster."</p>	<p>"Yes, definitely, especially for our visual learners, stimulating more senses."</p>	<p>"For sure, if used correctly, it will have a positive influence, unlock learners' learning potential and incorporate more senses, which promotes learning and development."</p>	<p>"Definitely, MP3s, YouTube videos, stimulates other senses and makes learning more effective; learners learn to work more independently."</p>	<p>Technology affects learners' development and learning experience.</p>

9. What challenges do you experience in using technology in your classroom?

Participants									Theme
A	B	C	D	E	F	G	H	I	Challenges in using technology in the classroom.
“Cyber bullying, being mean to one another. Ask Siri for anything. Wi-Fi sometimes very slow. Interruption in connection.”	“Electricity failure, no Wi-Fi, but we have one day a month without electricity to make kids more aware about it.”	“Wi-Fi disconnections. Have to re-teach some basic tech skills to certain learners.”	“Connectivity issues, some tools not user-friendly. An influx of information and knowledge.”	“Some kids are not on the same tech level; they need more attention, not always easy for them to keep up.”	“TV-screen is too small, projector is broken, and Wi-Fi problems.”	“TV-screen is too small, would like bigger and better TV or smartboard.”	“Wi-Fi challenges, would like a bigger TV or screen.”	“Not enough devices, learners have to share, some can't wait for their turn, time-consuming.”	

10. Do you know about different technology devices for learners who experience barriers?

Participants									Theme
A	B	C	D	E	F	G	H	I	
<p>“Yes, <b>speech-to-text, text-to-speech.</b> Zoom In, Zoom Out. face recognition for logging in.”</p>	<p>“Yes, in my class no kids have special requirements but the school has evaluators and is electronic wheelchair-friendly.”</p>	<p>“Yes, <b>audiobooks, Siri can read a book. Alternative assessments, learning support system device.</b>”</p>	<p>“A lot of <b>apps, software programs to differentiate your learning for everyone in your class.</b>”</p>	<p>“Yes, software programs, <b>C-pens helping kids who struggle with reading problems.</b>”</p>	<p>“Yes, our school uses <b>C-pens</b>, but I don’t have a lot of other experience about it.”</p>	<p>“Yes, <b>MP3s, audiobooks, tablets, pencil grips, and seat cushions.</b>”</p>	<p>“Yes, <b>MP3-players, tablets, printing worksheets and assessments in bigger font</b> and on colour paper.”</p>	<p>“Yes, <b>MP3s, Dictaphones, cell phones, tablets, free software programs, like Audacity to do recordings.</b>”</p>	<p>Different devices for learners experiencing barriers.</p>

11. Do you think learners who experience barriers to learning can be supported through technology?

Participants									Theme
A	B	C	D	E	F	G	H	I	Technology as a means to a goal.
<p>“Definitely, creative part is exposed and tech is an alternative way of helping children to reach their full potential.”</p>	<p>“Definitely a yes, looking and listening to stories, extension of English language as well as Google Translate services.”</p>	<p>“Definitely a lot of apps and software programs available to support them.”</p>	<p>“Absolutely, interactive, and visual. Kids make mistakes and learn from it when using technology. Language apps, children can learn any language.”</p>	<p>“Yes, it is an untouched area.”</p>	<p>“Yes, the C-pens help learners to improve their working speed and improve marks.”</p>	<p>“Yes, MP3s, audiobooks, tablets, pencil grips, and seat cushions.”</p>	<p>“Yes, absolutely, MP3 players develop literacy and using bigger font and specific font, like for dyslexics on worksheets.”</p>	<p>“Yes, for sure a lot of devices and certain software programs give learners more choices in their learning environment to show their potential.”</p>	

12. Do you make use of interactive teaching?

Participants									Theme
A	B	C	D	E	F	G	H	I	
<p>“Yes, it is part of our requirements as a teacher. Enhancing collaboration, our classroom set-up is that way.”</p>	<p>“Yes, a lot of peer teaching, group teaching, individual teaching, rotations and whole class teaching.”</p>	<p>“Yes, children have to ask three other kids first before asking the teacher.”</p>	<p>“Yes, a lot of collaborative learning and more student-centred.”</p>	<p>“Yes, a lot of practical subjects and group work.”</p>	<p>“Yes, we do it a lot and abstract concepts need more interactive teaching.”</p>	<p>“Yes, small group teaching and differentiated teaching lead to better results and consolidation of learning.”</p>	<p>“Yes, group work and incorporating a lot of different senses result in better learning.”</p>	<p>“Yes, group work and giving learners more choices.”</p>	<p>Use of interactive teaching in the classroom.</p>

13. What kind of technology are you using to support children who experience learning barriers?

Participants									Theme
A	B	C	D	E	F	G	H	I	Technology used in supporting learners with learning barriers.
<p>"Use iPads or tablets to type, record, listen, take photos, and make videos to assist in learning. Use Apple TV for visual learners."</p>	<p>"At the moment I only have a German learner, he has a communication barrier, I go to spell city and practice his English a lot."</p>	<p>"iPad, Google Docs has a lot of techniques to help these learners."</p>	<p>"App Store, find a lot of apps to help to differentiate and motivate the learners to keep going."</p>	<p>"We use C-pens, tablets and cell phones as well as YouTube videos to help them."</p>	<p>"TV, YouTube videos, C-pens, whiteboards, and coloured whiteboard markers to help these learners."</p>	<p>"Assistive low-tech, e.g. pencil grips, seat cushions, TV, YouTube videos to assist in learning, and for brain breaks."</p>	<p>"TV, CD player, YouTube videos, MP3 players as audiobooks to improve their literacy."</p>	<p>"Audiobooks, MP3 players, YouTube videos, software programs like: Audacity and Readers are Leaders."</p>	

14. How do you perceive inclusive education?

Participants									Theme
A	B	C	D	E	F	G	H	I	
<p>"I support it, I am against labelling. Everyone has potential, not for us to change the student rather change the system."</p>	<p>"It should happen everywhere. Mindset of teachers must change. We have to start there,"</p>	<p>"The way to go, new generation, a lot of diversity, authentic and to be more compassionate."</p>	<p>"Very positive, fosters a lot of skills in children. Appreciate different talents and learn from each other."</p>	<p>"Great concept, but teachers need more training in the practical part, especially to fulfil all the learners needs."</p>	<p>"Very important intervention. Our school sells itself, there are a lot of learners with unique needs."</p>	<p>"Very positive. Every child has an equal chance to show his/her potential."</p>	<p>"Very positive about it. Everyone who is able to learn, must get the chance to do so."</p>	<p>"Positive, but don't always have all the knowledge to help all the learners, especially those with learning barriers."</p>	<p>Change the system.  Great concept and intervention.  Everyone has potential.</p>

15. How does your learning environment support inclusive education?

Participants									Theme
A	B	C	D	E	F	G	H	I	Interactive learning environment.
<p>"Flexible seating, students have a choice, free movement, mixed ability interaction, peer teaching is encouraged."</p>	<p>"We are privileged to have a Tech coach, he helps us a lot, Tech conferences, invite teachers from other schools to learn from each other."</p>	<p>"Very good, we have our own Tech teacher who helps us a lot."</p>	<p>"We are an inclusive school, we help all kids to develop and reach their full potential. We use physical and visual tools."</p>	<p>"Very good, the learning environment is interactive and practical."</p>	<p>"We make use of peer teaching, pair work and small classes."</p>	<p>"Differentiated teaching to support different learning styles and do mini lessons."</p>	<p>"We do interactive teaching, re-teaching and mixed ability teaching, as well as peer teaching."</p>	<p>"Small classes, our school has a remedial department with a specialist teacher who helps us a lot."</p>	

16. What do you think should be done to enhance inclusive education in schools?

Participants									Theme
A	B	C	D	E	F	G	H	I	Teachers need more training and new mindsets.
"Focus more on learners' strengths, make room for mistakes, encourage kids to keep going."	"Change the minds of teachers, do more workshops on the topic."	"Need specialist teachers to help these kids."	"More holistic approach, schools rely on grades and numbers, mind shift, value every child the way they are."	"Teachers need to understand the concept and more training around the topic is needed."	"Teachers should be trained at college/university level, must be a subject for pre-graduates."	"Teachers need more training about the concept."	"More training about the topic. Assistants in classrooms to help the teacher when doing re-teaching."	"Make teachers more aware about it, give them appropriate training, more money to buy necessary technology devices."	

17. Considering the experience you have, can you say technology complements inclusive education? Why or why not?

Participants									Theme
A	B	C	D	E	F	G	H	I	
<p>“Yes, it does in a lot of ways. Tech makes it able to include everyone.”</p>	<p>“Yes, it is part of teaching and learning, I enjoy using tech because it benefits learning.”</p>	<p>“It does, kids are more focused, more engaged. It creates more learning opportunities.”</p>	<p>“Yes, absolutely 100%, in a big way it complements inclusion. Tech is everywhere. I can’t think of myself as a teacher without it.”</p>	<p>“Yes, but more can be done on tech side to complement inclusive education. Developing more software programs to complement inclusive education.”</p>	<p>“Yes, everyone will benefit from using tech. It brings the content to learners in different ways, satisfying all learning styles.”</p>	<p>“Yes, it is a different approach in teaching, complements learners who struggle more to understand better. Stimulates more senses, which results in better learning.”</p>	<p>“Yes, makes learning more accessible and supports learners who experience barriers to help them also reach their full potential.”</p>	<p>“Yes, learners enjoy it, we can help them/support them better to achieve their full potential.”</p>	<p>Tech includes everyone.  Differentiated teaching.  Tech makes learning more accessible.</p>

## APPENDIX I: SUMMARY OF MAIN THEMES

<b>Theme 1:</b>	<ol style="list-style-type: none"> <li>1. Type of learning environment.</li> <li>2. Technology as a pedagogical tool.</li> <li>3. Teachers beliefs about the compulsory life of technology in the classroom.</li> <li>4. Technology as a pedagogical tool affecting the learner's development and learning</li> <li>5. Kind of technology used to support learners with learning barriers.</li> <li>6. Teacher's experiences about technology complementing inclusive education</li> </ol>
The role of technology in developing inclusive education in Namibia	
<b>Theme 2:</b>	<ol style="list-style-type: none"> <li>1. Enhancement of technology in schools</li> <li>2. Teacher are comfortable using technology</li> <li>3. Support for learners who experience barriers to learning</li> <li>4. Interactive teaching in the inclusive classroom</li> <li>5. Learning environment supporting inclusive education</li> <li>6. Learning environment supporting inclusive education</li> <li>7. Enhancement of inclusive education in schools</li> </ol>
Teachers perceptions of technology and inclusive education	
<b>Theme 3:</b>	<ol style="list-style-type: none"> <li>1. Appropriate training in using technology</li> <li>2. Challenges experienced by teachers in using technology in the inclusive classroom</li> <li>3. Additions or changes regarding technology in the inclusive classroom.</li> </ol>
Challenges of using technology in developing inclusive education	

## APPENDIX J: CLEARANCE CERTIFICATE



### UNISA COLLEGE OF EDUCATION ETHICS REVIEW COMMITTEE

Date: 2019/02/13

Ref: **2019/02/13/07157606/10/MC**

Name: Mrs ZA Van Wyk

Student: 07157606

Dear Mrs Van Wyk

**Decision:** Ethics Approval from  
2019/02/13 to 2022/12/13

**Researcher(s):** Name: Mrs ZA Van Wyk  
E-mail address: zvanwyk@rweb.com.na  
Telephone: +264 81 124 2575

**Supervisor(s):** Name: Prof S Ntombela  
E-mail address: ntombel@unisa.ac.za  
Telephone: +27 12 481 2881

#### Title of research:

**Teachers' experiences of technology as a developer of inclusive education in primary schools of Namibia.**

**Qualification:** M. Ed in Inclusive Education

Thank you for the application for research ethics clearance by the UNISA College of Education Ethics Review Committee for the above mentioned research. Ethics approval is granted for the period 2019/02/13 to 2022/02/13.

*The low risk application was reviewed by the Ethics Review Committee on 2019/02/13 in compliance with the UNISA Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.*

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.



2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the UNISA College of Education Ethics Review Committee;
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing.
5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable; Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.
7. No field work activities may continue after the expiry date **2022/02/13**. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number **2019/02/13/07157606/10/MC** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.

Kind regards,



**Prof AT Motilabane**  
**CHAIRPERSON: CEDU RERC**  
 motilab@unisa.ac.za



**Prof V McKay**  
**EXECUTIVE DEAN**  
 Mckayv@unisa.ac.za

Approved - decision template – updated 16 Feb 2017

University of South Africa  
 Foster Street, Muldersburg Ridge, City of Tshwane  
 PO Box 283 UNISA-0003 South Africa  
 Telephone +27 12 429 8111 Facsimile +27 12 429 4150  
 www.unisa.ac.za

## APPENDIX J: LANGUAGE EDITING CERTIFICATE



• PO Box 10148, Henbyl, 1906 South Africa • Mobile: +27 (0)83 304 1006 •  
• E-mail: elizezywot631@gmail.com • Website: <http://ezlang.wix.com/ezcommklang> •

### Declaration

This is to confirm that I, the undersigned, have language edited the Master's dissertation entitled "*TEACHERS' EXPERIENCES OF TECHNOLOGY AS A DEVELOPER OF INCLUSIVE EDUCATION IN PRIMARY SCHOOLS OF NAMIBIA*" by Zelda van Wyk for the degree Magister Artium in Education in Inclusive Education:

The responsibility of implementing the recommended changes and corrections rests with the author of the dissertation.

A handwritten signature in black ink, appearing to read 'Ezywockiewicz', is written in a cursive style.

Elize Zywockiewicz  
Language Editor and Translator \*

2019-11-07

• Accredited member of the South African Translator's Institute (SATI) • Membership No. 1000151  
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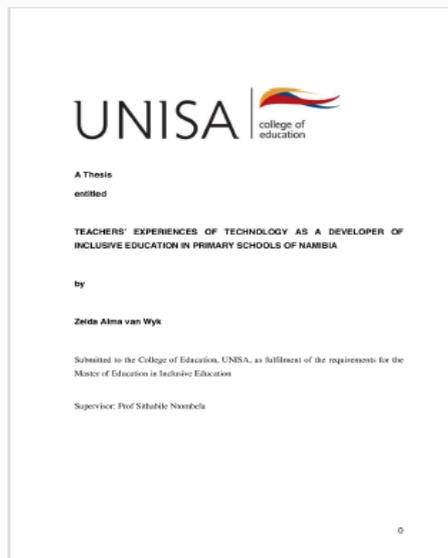


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