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**UNIVERSITY  
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**FOUNDATION PHASE TEACHERS' PERCEPTIONS OF  
USING MOBILE LEARNING TECHNOLOGY TO ASSIST  
LEARNERS WITH ADHD IN A PRIVATE REMEDIAL  
SCHOOL**

by

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**University of Johannesburg**

Supervised by

**DR M.P. VAN DER MERWE**

**January 2019**



**UNIVERSITY OF JOHANNESBURG**

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**6 December 2018**

## **AFFIDAVIT**

I **Denise Northcott** (Student No: **216026097**) hereby declare that this minor-dissertation called: **FOUNDATION PHASE TEACHERS' PERCEPTIONS OF USING MOBILE LEARNING TECHNOLOGY TO ASSIST LEARNERS WITH ADHD IN A PRIVATE REMEDIAL SCHOOL**, is my own, original work and that it has not previously been submitted to the University of Johannesburg or any other university for the purposes of a degree. Every effort has been made to reference all sources used, and I have adhered to the highest possible technical and ethical standards. The minor-dissertation has been professionally edited (confirmation letter attached hereto as Appendix A) and signed off by my research supervisor as complete.

Signed on this 6th day of December 2018, at Johannesburg.

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Denise Northcott

216026097

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## ABSTRACT

South Africa has a Special Schools' population of 119 403 learners who present with neurodevelopmental disorders, wherein 2.49 % of learners have been diagnosed with ADHD. Schooling for these learners can be frustrating in many respects, for both the teacher, parents and the learner.

As the Foundation Phase is of great importance in developing fundamental knowledge and skills, most ADHD learners develop academic difficulties during this phase. Teachers teaching in the Foundation Phase are therefore vital to the lives and success of learners with barriers to learning and development, including ADHD learners, as this is the period where their education for the future is underpinned.

The International Society for Technology in Education (ISTE) believes that mobile digital learning technology, i.e. MLT, plays a central role in ensuring all learners succeed at school stating that technology, used effectively, can help learners meet and exceed expectations. As the use of MLT, such as iPads, in schools is still in its developmental stage, continued research and empirical studies need to be conducted. The research has not been performed on teachers' perceptions of the use of iPads in the classroom, especially in the Foundation Phase.

The purpose of this study was to explore and describe Foundation Phase teachers in Remedial schools perceptions of the use of mobile learning technology to support learners presenting with Attention Deficit Hyperactivity Disorder (ADHD). The study is set within an interpretivist paradigm and utilises a qualitative case study design. Purposive sampling was used and one remedial school in Gauteng Province was selected purposively to be the focus of the study. The Foundation Phase teachers in the selected school were also purposively selected to participate in the study.

This study showed that there is clear evidence that the teacher's perceptions of MLT and its associated apps did support learners with ADHD. Important findings indicated that greater focus on establishing a learning environment for supporting learners, more focused training on how to orchestrate and manage the learning, as well as an inherent need for agency and autonomy in deciding on and using the MLT and associated applications were needed.

**Keywords:** *Attention Deficit Hyperactivity Disorder (ADHD), ICT (information communication technology), MLT (mobile learning technology), applications, Ipads, support tools, teachers perceptions, Foundation Phase*

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## ABBREVIATIONS & ACRONYMS

ADD	-	Attention Deficit Disorder
ADHD	-	Attention Deficit Hyperactivity Disorder
APA	-	American Psychiatric Association
CD	-	Conduct Disorder
DoE	-	Department of Education
DoBE	-	Department of Basic Education
DBST	-	District-based Support Team
DSM-V	-	Diagnostic and Statistical Manual of Mental Disorders – V, Fifth Edition
IEP	-	Individual Education Plan
LD	-	Learning Disorder
MPH	-	Methylphenidate
RD	-	Reading Difficulties/disorders
SIAS	-	Screening Identification Assessment and Support
SBST	-	School Based Support Team
SALT	-	Speech and Language Therapy
UNESCO	-	United Nations Educational, Scientific and Cultural Organisation
WP6	-	White Paper 6

# CHAPTER ONE: INTRODUCTION TO THE STUDY

*“ To foreground Foundation Phase Education unambiguously as a critical area for development and growth in South Africa ”.* (Ms Naledi Pandor Minister of Education at the Foundation Phase conference 30 Sep 2008).

## 1.1 BACKGROUND TO THE STUDY

Quality Foundation Phase education and the experience of learners in this phase are critical to the educational goals for South Africa as a country and are linked to the primary goals of society such as social justice, equality and participatory democracy, particularly in post-Apartheid South Africa (Verbeek, 2014). Mourshed, Chijioke, & Barber, 2010 states that as we progress into the 21 century there is a drive to provide students with an education system that is holistic and looks closely at the diversity in the classroom and how to meet the needs of the developing learners. Verbeek (2014), goes on to state that learners who fall behind the expected academic achievement norms for their age during the Foundation Phase of schooling, rarely catch-up academically. Even more concerning is the longer they are not supported correctly in this phase the more the problem compounds, resulting in their failure in the system becoming more like a guarantee rather than a possibility (Mourshed, Chijioke, & Barber, 2010; Verbeek, 2014).

Learners in the zero to nine age range go through extensive changes and development on the cognitive, biological and social level. During this period of development, learners enter Foundation Phase education, generally at the age of five, where critical aspects such as foundational skills in language, reading, writing, mathematics, self-awareness, self-esteem and self-control are developed (Verbeek, 2014). In addition, research also indicates that neurodevelopmental disorders are experienced on average by 15% of children aged three to 17 worldwide and that such disorders affect the personal, social, academic and career domains (American Psychiatric Association, 2013). These disorders have an even more profound effect on learning of foundational skills such as language, speech, behaviour, emotions, memory, physical ability, motor skills, cognitive function, learning and neurological function, such as those expected during the Foundation Phase (American Psychiatric Association, 2013; Landsberg, 2016; Verbeek, 2014).

The mandate outlined in the *White Paper 6 (WP6)* (2001), is to create an education system that includes all learners; providing all learners with access to the curriculum, no matter what learning barriers they may experience (Ahmad, 2015; Department of Education (DoE), 2001; Landsberg, 2016). This is a call to improve the quality of education and interventions in schools and therefore assumes individualised teaching and support to achieve their potential regardless of the barriers they may be facing (DoE, 2001; Parker, 2006; Rief, 2016; Statistics South Africa, 2016; Weeks, 2003).

Consistent with the improvement of quality education, are the proposed types of schools to achieve these outcomes. The schooling system in South Africa consists of mainstream schools, full-service schools and special schools where learning, development and support are meant to occur and are present in both the public and the private sector (DoE, 2001; Department of Basic Education (DoBE, 2018; Nel, 2014). Mainstream schools cater for learners who perform in the average, and above average range and the imply availability of low to moderate levels of support for learners (DoE, 2001; DoBE, 2018). Full-service schools (FSS) were created to be specially equipped to provide specialised support, resources and services that address low, moderate and high levels of support (DoE, 2001; DoBE, 2018). FSS is essentially mainstream schools that provide quality education for a full range of learning barriers and psychosocial needs. However, the reality is that these classes do not always provide the necessary support for learners in practice as many of these schools are under-resourced, leaving learners still needing much support (DoE, 2001; DoBE, 2018; Mahlo, 2011; Nel, 2014).

Special schools are schools where high support is offered to learners presenting with barriers to learning and development (DoE, 2001; DoBE, 2018). Such schools generally require a low staff to learner ratio, and ‘access to high frequency and high intensity’ support by specialised staff. Remedial schools are typed as special schools, which provide continuous support to learners on both a full-time and part-time basis. The remedial environment creates a focus on individualised support, with learners all having Individualised Education Programmes (IEPs). Their focus is also finding appropriate ways to support learners with barriers (Kern, Amod, Seabi, & Vorster, 2015; Nel, 2014; Motitswe, 2012; Wentzel, 2016). Remedial schools are expected to become resource centres in the long term, providing support to the district support team, and their support of mainstream and full-service schools (DoBE, 2018; Mahlo, 2011; Wentzel, 2016).

In this study, therefore, the Foundation Phase is a period of important and intense development and learning wherein early intervention and support are critical to learners' long-term success in the educational system. Moreover, when learners find themselves in remedial school contexts, greater individualised support using a variety of interventions may be required from teachers (Verbeek, 2014).

This chapter thus intends to motivate the need for this study, to state the research questions and aims for the study, and to provide an overview description of the research design and methodology to be followed.

## **1.2 RATIONALE FOR THE STUDY**

South Africa had an enrolment of 119 403 learners in 455 special schools in 2016 (Department of Basic Education (DoBE, 2016). Furthermore, the estimated population in these schools who presented with neurodevelopmental disorders amounted to 102 295 learners (DoBE, 2016), which indicated an approximately 86% of the population within these schools being diagnosed with a neurodevelopmental disorder (DoBE, 2016). This statistic may point to the need for greater understanding of these disorders and the possible practices to support learners presenting with such barriers to learning.

As mentioned in the introduction, neurodevelopmental disorders are prevalent during the development period between the ages of 0 to 18 years, having wide-ranging effects on basic neurological development, and include Attention Deficit Hyperactivity Disorder (ADHD), autism, specific learning disabilities, intellectual disabilities, conduct disorder, cerebral palsy, and physical, visual and aural impairment (American Psychiatric Association (APA), 2013; Elphick, 2015; Environmental Protection Agency's (EPA, 2013).

ADHD as a disorder appears to be one of the most common developmental disorders across the world (Barkley, Mash, & Wells, 2006; Cota, 2008; DoBE, 2015; EPA, 2013; Hovie, 2012). For example, in 2013, the exact statistics in American schools were that three to five per cent of the American school population were identified as having ADHD (APA, 2013). Statistics appear to bear this out in South Africa as well, when one considers that 2 978 learners in South African special schools in 2016 were diagnosed with ADHD, amounting to 2.49% of the special school's population (DoBE, 2015; Nel, 2014).

According to the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5), ADHD is associated with impulsivity, poor organisational skills, distractibility and difficulties in completing tasks. These learners tend to underperform in relation to learners of the same age and development, specifically in scholastic, academic and social-emotional matters. The experience of schooling for these learners in the classroom can therefore be frustrating in many respects, for both the teacher, parents and the learner (APA, 2013; Barkley, 2006; Cota, 2008; Daly, Hildenbrand, & Brown, 2015; EPA, 2013; Landsberg, 2016; Seidman, Valera, & Makris, 2005). As the Foundation Phase is of great importance in developing fundamental knowledge and skills as mentioned, most ADHD learners develop academic difficulties during this phase which becomes prevalent in the schooling experience (Barkley, 2006; Landsberg, 2016; Parker, 2001).

Given the significant move towards equal and equitable quality education for all in South Africa, Foundation Phase teachers may generally be the first to encounter learners presenting with several barriers to learning, including ADHD. This may be exacerbated by the reality that in South Africa, due to numerous factors of which the initiative towards inclusive education initiative is one, mainstream classrooms in South Africa are overcrowded, and facilities are inadequate which makes it doubly difficult for teachers to not only identify, but to support learners presenting with barriers to learning and development (DoBE, 2018; Ghanizadeh, 2010; Nel, 2014). In the case of remedial schools, the remedial school environment is an environment where learners with barriers to learning such as ADHD, are provided with more specialised support by specialised professionals daily. The staff generally includes such specialist staff as occupational therapists, speech therapists, psychologists and learning support therapists to support teachers in their endeavours to educate learners inclusively (DoBE, 2014; DoBE, 2018; Weeks, 2003). This environment allows for smaller classrooms with specialised support in socialisation, handwriting, reading, comprehension, mathematics, and dealing with concentration deficits in adaptive ways (Mahlo, 2011; Weeks, 2003).

Furthermore, there is a realisation that early childhood development programmes and Foundation Phase education is where learners form the basis of their academic and developmental coping skills and strategies. These skills and strategies are for life and future learning leads to a renewed focus on the need for institutions to give attention to eliminating barriers to learning and development during this period, and to modify the curriculum to specific and individual needs (Statistics South Africa, 2016). Teachers teaching in the



Foundation Phase are therefore vital to the lives and success of learners with barriers to learning and development, including ADHD learners, as this is the period where their learning for the future is underpinned (Barkley, 2006; Kern et al., 2015; Nel, 2014; Nelson, 2007).

A strong movement toward 21<sup>st</sup>-century education requires four main skills namely, critical thinking, communication, collaboration and creativity (Harshbarger, 2016). In addition, a move towards education for the Fourth Industrial Revolution calls for skill-sets such as “meta-learning, creative problem solving, collaboration, learning to apply knowledge in new and different ways ... to be provided to our learners” (Motshekga, 2018). Motshekga (2018), further posits that “alignment of content and teaching methodology to real-life situations in the context of the Fourth Industrial Revolution are therefore imperative”. The crucial question thus arises of how learners, particularly in the Foundation Phase, can be supported to make this transition. The International Society for Technology in Education (ISTE) believes that mobile digital learning technology, i.e. MLT, plays a central role in ensuring all learners succeed at school, stating that technology, used effectively, can help learners meet and exceed expectations. Technology provides access to tools and resources that personalise learner’s instruction and creates vibrant, engaging and relevant environments for learners (Frazier, 2014).

Technology has expanded to create new learning opportunities mainly through the use of MLT such as iPads, allowing access to educational resources beyond traditional teaching and learning methods (Ahmad, 2015; Cumming & Rodríguez, 2017; Florian & Hegarty, 2007; Hasselbring & Glaser, 2000; Ludlow, 2001; Serero, 2010; Sharma, 2015; Tillman, 2003; UNESCO Institute, 2006).

Mobile Learning Technology (MLT) such as iPads and cellphones allow non-restrictive learning (Xie, Basham, Marino, & Rice, 2018), and use downloadable educational applications which are often used to support learning through the creation of self-directed, learner-centred, and creative learning opportunities. Applications (apps) are often easily accessible, in many cases free, and may be useful in supporting learning in school settings in ways that were not previously possible (Lee & Kim, 2015; Shuler, 2012).

Apps on MLT devices like iPads provide immediate feedback to learners. They are appealing and relevant and easily understood as they accommodate both visual and auditory modalities, making MLT multisensory. Teachers can customise these applications by adapting levels of

difficulties, changing voices, languages and reward systems. The MLT apps can also be used to remediate specific barriers in specific areas of learning, i.e. literacy, numeracy, social skills and communication (Frazier, 2014).

MLT apps have been shown to support learning and development, especially in supporting individuals with a disability. Furthermore, Wearmouth (2008), suggests that MLT have the potential to be used as a tool to reduce barriers to learning in three particular domains, namely the cognitive, emotional and physical domains; domains learners presenting with ADHD generally find challenging. MLT apps also provide added opportunities and alternative methods of instruction that incorporate an individualised setup and flexible assessment (Serero, 2010). With specific reference to ADHD learners, MLT and associated apps could provide stimulating support opportunities by making instruction multisensory, thus allowing active participation (Olusakin, Osarenren, & Obi, 2008).

Although the meta-analysis of existing research indicates some evidence exists to support the use of MLT, limited research focusing specifically on the use of MLT and associated apps with learners with learning difficulties was found (Cumming & Rodríguez, 2017; Nelson, 2007; Regan, Berkeley, Hughes, & Kirby, 2014; Xie et al., 2018), and such studies were predominantly conducted in mainstream schools (Mogodi, 2013).

As the use of MLT, such as iPads, in schools is still in its developmental stages, continued research and empirical studies need to be conducted. The research, in particular, has not been conducted on teachers' perceptions of the use of iPads in the classroom especially in the Foundation Phase (Frazier, 2014).

### **1.3 PROBLEM STATEMENT**

South Africa has implemented EWP6 in 2001 which has been slow, facing many barriers and challenges which has seen only 4% of learners with barriers to learning receive the necessary placement and support ( Japari School, 2018). Independent schools and Remedial schools are trying to fill this gap and create environments where these learners are receiving the necessary support and placement ( Japari School, 2018, 2019). ADHD is seen as one of the most prevalent neurodevelopmental disorders (Barkley, 2006; Decaires-Wagner & Picton, 2009). Gauteng is seen as the province with the most ADHD learners (DoE, 2016). Remedial schools are environments where learners with ADHD find specialised individual attention, where

interventions are implemented continuously to support the learners (DoBE, 2014; DoBE, 2018; Weeks, 2003).

Research by Nelson (2007) and Nel (2014) indicated that there is a lack of research in South Africa related to interventions in the classroom to support ADHD learners. The Foundation Phase is seen as the phase where the teachers are required to teach the foundational skills to read, write and do basic numeracy (DoE, 2003). This phase is noted as to where most teachers first encounter learners who present with ADHD (Decaires-Wagner & Picton, 2009). These teachers face a challenge in supporting these learners, early intervention is seen as vital for learners to succeed long term ( Japari school 2018, 2019).

Research reviews by Hoadley (2010), state that there is very little research in the Foundation Phase specifically. Research indicates that teachers in the Foundation Phase need to develop interventions that support learners in overcoming their specific learning barriers (Govender, 2003; Kern et al., 2015; Olusakin et al., 2008).

Although research exists globally related to the effectiveness of ICT and MLT as intervention/supportive devices (Regan et al., 2014), how such technologies are used effectively to support learners with barriers to learning and development is limited (Cumming & Rodríguez, 2017; Nelson, 2007; Regan et al., 2014). This is particularly the case in South Africa, with only a handful of studies pointing to effectiveness in specific subjects, for example, mathematics (Mogodi, 2013).

Internationally, however, much research has been done which focuses on the use of ICT and MLT with regards to the assistance of learners to gain specific skills in mathematics, spelling, and reading (Bouck & Flanigan, 2009; Blischak & Schlosser, 2003; Kara, 2008; Torgesen et al., 2010 as cited by Regan et al., 2014). MLT is also widely acknowledged and recognised as an essential resource for teachers, but this research also acknowledges the importance of the teacher and that the device can't replace the teacher (Cumming & Rodríguez, 2017; Richardson, 2014; Hasselbring & Glaser, 2000; Ludlow, 2001; MacArthur & Malouf, 1991; Moore, Rieth, & Ebeling, 1994).

In addition, research indicates that the interaction between the teacher and the MLT is key to its successful use as a supportive tool, pointing specifically to the importance of the teacher's attitude towards, and their knowledge of how an MLT and its associated applications can be

used as essential considerations (Ludlow, 2001; MacArthur & Malouf, 1991; Mogodi, 2013; Moore et al., 1994; Richardson, 2014).

From the above, it is clear that there is a need for research in the Foundation Phase (Honkasilta, 2016). Honkasilta (2016), states it is evident that there is a call for research related to interventions for foundation phase teachers. ADHD learners, in particular, require individual attention to help overcome the frustrations they face in class, and the potential of using MLT and associated apps to assist ADHD learners overcome their difficulties have also been noted in this regard (Barkley, 2006; Kern et al., 2015; Nel, 2014; Nelson, 2007). Teachers' perceptions of these learners and the interventions they implement are also seen as vital to the success of the learner long-term (Barkley, 2006; Kern et al., 2015; Nel, 2014; Nelson, 2007).

Given the discussed importance of the Foundation Phase in the development and learning of young children, as well as the possibility of MLT and associated apps in the support of learners in remedial education, the problem that this study aims to address, is to gain an understanding of how Foundation Phase teachers in a remedial school perceive the use of mobile learning technology and associated apps to support learners presenting with ADHD.

The primary research question, therefore, is formulated as:

*What are Foundation Phase teachers' perceptions of using mobile learning technology to support learners presenting with ADHD in a remedial classroom?*

*Secondary questions are:*

*Which external factors are influencing the teacher's use of mobile learning technologies to support learners presenting with ADHD in a remedial classroom?*

*What kind of programs and applications is being used on mobile learning technologies to support learners presenting with ADHD in a remedial classroom?*

*What role are training and development having on the use of mobile learning technologies to support learners presenting with ADHD in a remedial classroom?*

## **1.4 PURPOSE AND AIM OF THE STUDY**

The purpose of this study was to explore and describe Foundation Phase teachers in remedial schools' perceptions of the use of mobile learning technology to support learners presenting with Attention Deficit Hyperactivity Disorder (ADHD).

This particular study aimed to explore and describe how Foundation Phase teachers in one selected remedial school perceived:

- The use of mobile learning technology to support learners presenting with ADHD;
- The use of associated applications (apps) of MLT to support learners presenting with ADHD; and
- To propose guidelines for how teachers in the Foundation Phase in remedial schools can be supported when using MLT and its associated applications (apps) to support learners presenting with ADHD.

## **1.5 THEORETICAL FRAMEWORK**

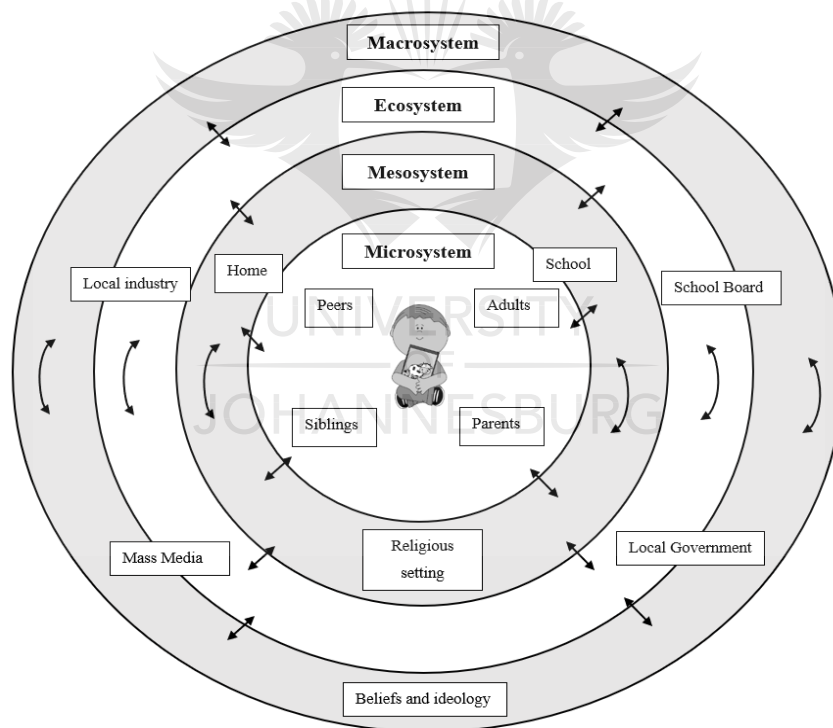
### **1.5.1 Core theoretical framework**

Urie Bronfenbrenner argues that “to understand human development, one must consider the entire ecological system in which growth occurs” (1994, p. 37).

Applying Bronfenbrenner's Ecological Systems theory to this research requires the analysis of the different influencing systems. This looks at the teacher and how they perceive the mobile technology as a support to ADHD learners. In turn, we see the interaction of the teacher with the devices and how they support learners with ADHD. There is an awareness of the challenges ADHD learners experience across their environmental systems. These learners are therefore seen “as a whole”, and there is the impact of the surrounding environment and significant role players, in how support is provided and the success of that support.

There are four interacting categories for Bronfenbrenner's systems model which are central to this research. These categories include the personality of the client and their parents and caregivers which can be classified as individual factors (Bronfenbrenner, 1994; Landsberg, 2016). This can include the personality and learning style of the learners and what their needs are when it comes to learning in a way they understand. This is the microsystem. From the above system, one progresses to looking at the family system currently and previously, noting the interaction. There is an awareness that the learners that are in the class are not isolated and do have experiences which include their interactions with teachers, parents, siblings, etc. The

diagnoses of ADHD defines symptoms being present in all areas and systems (Barkley, 2006). This is known as the mesosystem. We also need to understand the system that we are researching in the community and role of the school, as well as the socioeconomic position of the school. These aspects become important in the results and recommendations and understanding of the context itself and the influence on the teacher’s perceptions and learners needs, known as the macrosystem (Bronfenbrenner, 1994). All these systems change over time and can be associated with the major divisions and important transitions that take place in the life of a person. Any such changes will undoubtedly interactively affect the development of the person in totality (Bronfenbrenner, 1994). Considering that this framework forms the foundation of the study, the specific systems located in remedial schools, the specific development and support needs of the ADHD learner, the value of the teachers as key role players, as well as the awareness of the potential of mobile learning technology to interact with learners and teachers in meeting learner needs, will be the main areas of exploration.



**Figure 1.1: Bronfenbrenner Ecological System Theory (Adapted from Penn, 2005)**

### **1.5.2 Other important theories**

Vygotsky believed that learners learn through play and that everyday experiences help them to build on their existing knowledge. Learning is constantly building on old knowledge (Vygotsky, 1978). He believed that languages are imperative to cognitive development. He

also saw how vital it was that learners learn at their own pace and understanding. The content cannot be too hard or too easy, it must be just right to create the zone of proximal development. Where learners are not able to complete a task today on their own, they may through demonstration and scaffolding be able to move to a more independent level of development (Pound, 2006; Vygotsky, 1978). In addition, Gardner’s theory of multiple intelligences points to the importance of understanding and knowing how learners learn and where their strengths and weakness are (Armstrong, 2009). Understanding that each learner has a preferred learning style which is a strength and adapting the learning interaction and experience to improve the learning experience, particularly with the choice of supportive technologies such as iPad apps, becomes essential (Venter, 2013).

## 1.6 RESEARCH DESIGN AND METHODOLOGY

Research design generally refers to a planned process with a specific problem or area of interest as the focus (Creswell, 2014; Leedy, 1997; MacMillan & Schumacher, 2001). This process involves identifying and motivating the problem and formulating the problem into a research problem, with a further explanation of the general strategy or approach to be followed, as well as how data was collected and analysed and the procedure for reporting on the findings (Creswell, 2014; Leedy, 1997; MacMillan & Schumacher, 2001).

The research methodology refers to the strategy or approach needed to implement the chosen design methodically. Research methodology thus focuses specifically on the selection of the research site, who will be selected to participate in the study, and the data collection and analysis procedures required to find answers to the research questions set (Creswell, 2014; Leedy, 1997; MacMillan & Schumacher, 2001).

A brief description of the research design and methodology for this study now follows in Table 1.1. A comprehensive discussion will follow in Chapter Three of this minor-dissertation.

**Table 1.1: Tabular representation of the research design and methodology**  
(a detailed description of the below is presented in chapter 3)

<b>Research Approach</b>	Qualitative approach	Qualitative research is primarily exploratory. The idea behind the qualitative approaches to gain an understanding of underlying information, opinions and insights. This form of research is used to generate and develop hypotheses for potential qualitative research (Creswell, 2007). This exploratory study intended to gain an understanding of teachers perceptions of how mobile learning technology and
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		its associated applications were used to support learners presenting with ADHD. This research is primarily an exploratory study to gain insight and information on potential hypotheses that could develop into further research. For this reason, the qualitative approach is used.
<b>Research Paradigm</b>	Interpretive study	As this study is attempted to understand teachers' perceptions of the use of mobile technology to support learners presenting with ADHD in a remedial classroom, I assumed that the teachers' views were embedded in their social reality (Cherrington, 2017). I there attempted to interpret these views to arrive at an understanding. This study, therefore, studied the issue within its natural setting and attempted to be cognisant of a contextual variable within the school context (Creswell, 2007; McMillan & Schumacher, 2014).
<b>Research Design</b>	A qualitative case study design	The use of a case study allowed me to gain a rich understanding of the context of the research. The aim was to understand and analyse in depth, how teachers in one closed system (a remedial school), and at a particular time and place perceived a specific activity, event, and process using multiple sources of information to gain a deep understanding of the problem (Creswell, 2007; Creswell, 2014; de Vos, Strydom, Fouché, & Delport, 2011; 2011; McMillan & Schumacher, 2014; Saunders, Lewis, & Thornhill, 2015; Scott & Morrison, 2005; Yin, 2011). I was the primary research instrument and guarded against personal bias.
<b>Research Methodology</b>	Case selection – the site	Purposive sampling is used in qualitative research to help understand a phenomenon under study (Creswell, 2014) and was, therefore, the most suitable sampling method for the current study which attempts to explore and understand teachers' perceptions of how learners presenting with ADHD were supported through the use of MLT in a remedial school. One remedial school in the Gauteng province were firstly purposively selected as this province has the most remedial schools and the most learners who experience ADHD (DoBE, 2015). From these remedial schools in Gauteng, one school was selected purposively to be the focus of the study.
	Participant selection	The Foundation Phase teachers in the selected school were purposively selected to participate in the study. The Foundation Phase in this school consists of nine classes, namely one Grade R class, two Grade 1 class, three Grade 2 classes and three Grade 3 classes. One teacher from each of the Foundation Phase grades was randomly selected to be part of the study.
	Data-collection	Individual interviews The interviews used in this case study were semi-structured interviews. Semi-structured interviews are guided interviews, generally used to support data emerging from other sources, is generally shorter than open-ended interviews and have a set of predetermined questions focused on answering the research question Creswell, 2007; Creswell, 2014; de Vos et al., 2011; Maree, 2011; Scott & Morrison, 2005; Saunders et al., 2015; McMillan & Schumacher, 2014). Semi-



			structured interviews, therefore, follow a basic interview schedule (Creswell, 2007; Creswell, 2014; de Vos et al., 2011; Maree, 2011; Scott & Morrison, 2005; Saunders et al., 2015; McMillan & Schumacher, 2014). An interview schedule focusing broadly on the problem was used. The interviews were done at a convenient time for the participants. The principal and participants had to sign consent forms to participate. The interviews were held in a private classroom where no interruptions could take place. These interviews were recorded and later transcribed.
		Focus group interview	Focus group interview was conducted with the remaining Foundation Phase teachers not initially selected to be participants in the individual interviews for the study. This focus group interview aimed to enhance the data from the individual interviews and to provide multiple perspectives on the issues and allow for a broader range of information and understanding (Creswell, 2007; Creswell, 2014; de Vos et al., 2011; Maree, 2011; Scott & Morrison, 2005; Saunders et al., 2015; McMillan & Schumacher, 2014). The interview was scheduled at a time and place convenient for teachers after school, conducted by the researcher and audio-recorded with the consent of the participants. A single, guiding question was used for the Focus group interview.
	Data-analysis	Content analysis	This study made use of Thematic Content Analysis in which patterns or themes in the data were identified (Maguire & Delahunt, 2017). The researcher chose this method to analyse the data as it allows for flexibility in data collection and analysis (Maguire & Delahunt, 2017). A six-step framework as developed by Braun and Clarke (2006), was used in the analysis. The detailed description of this framework is given in chapter 3 section 3.4: 1. Familiarisation with data, 2. Generation of initial, 3. Finding themes, 4. Reviewing themes, 5. Defining themes and 6. Writing-up themes.
<b>Trustworthiness of data</b>	Credibility		The researcher ensured that the data collection process and the recording of the data were completed according to the ethical guidelines and processes outlined. The researcher took careful cognisance of the context in which the data was collected to minimise possible misunderstandings during data-collection (Shenton, 2004). The researcher was familiar with the school environment where the data was collected but regularly reflected with her supervisor on the processes of data collection and –analyses to curb against possible researcher bias.

	Transferability	The researcher attempted to explain the protocols for data collection and data analysis procedures as clearly as possible for possible use in similar contexts (Burchett, Mayhew, Lavis & Dobrow, 2012; Creswell, 2007; Scott & Morrison, 2005; de Vos et al., 2011; Saunders et al., 2015; Creswell, 2014; McMillan & Schumacher, 2014; Yin, 2011). The hope is that the perception of teachers in using MLT and specific applications as became apparent in this study may be transferable to similar and even related teaching contexts.
	Dependability	The researcher clearly outlined the research design and methodology as well as data collection and –analysis procedures in this study. The researcher ensured that data was analysed according to a protocol, and ensured detailed accounts of the recording, analyses and findings emanating from the data. All data sources and analyses were provided to ensure the dependability of the study.
	Confirmability	All data collection and –analyses procedures were carefully catalogued and stored for scrutiny. Member-checks were also used to ensure that the transcriptions of interviews were reflective of the actual conversation between the researcher and the participants. The researcher disassembled and reassembled the data during the analysis process on more than one occasion to ensure that the data was analysed thoroughly and as unbiased and accurately as possible. More than one critical reader, including the researcher's supervisor, was also requested to continuously read the work in an attempt to assist in ensuring confirmability.
<b>Ethical considerations</b>		Ethical clearance was obtained before proceeding with the study. This is an independent private school owned by a trustee board and managed by the principal. Permission to do this research in this school was obtained from the principal. The participants all needed to fill in consent forms to participate in this research study.
	Privacy	All interviews were given labels so as not to identify the participant or the class used. The fact that there was only one Grade R classroom was the exception, although the researcher is ensuring that no identifiers for these participants were located on any of the data sources or analyses.
	Voluntary	They were provided with detailed information regarding the study beforehand to ensure that the process was transparent and clearly outlined to them. They were given the option of withdrawing their participation at any time without fear of any consequence or penalty.
	Consent	All participating teachers were provided with a detailed description of what the research aimed at, what their roles and responsibilities in gathering data were, as well as what their rights were about the research. This was achieved by way of a formal letter of consent which described the study as well as the responsibilities and rights they had as participants.
	Confidentiality	This included the name of the school and the teacher's identifiers of the classes. All names and identifiers were replaced with codes, mainly letters and labels. The information of all involved was protected from the start of the research to its conclusion.

	No Harm	Their well-being was a priority. Any incidents occurring which caused pain or harm to any participants were immediately referred to the Educational Psychologist at the school for counselling.
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## **1.7 CLARIFICATION OF CONCEPTS**

### **1.7.1 Foundation Phase teachers**

Teachers are people that impart knowledge and skills to learners. Foundation phase teacher imparts this knowledge to learners in Grade R-3 (DoE, 2001). FP teachers work with the foundations of reading, writing and literacy (DoE, 2003). They are there to help learners develop the base of their thinking skills which included the encouragement of the learner's social, emotional, intellectual and physical development (DoE, 2003).

### **1.7.2 Experience and perception**

In this study perception refers to a person's beliefs about a given topic relates to personal interaction and observations of the topic, thus the way one thinks or understands something. What one notices or how one interacts with something (Govender, 2003).

### **1.7.3 Technology**

Something invented by science and industrial engineering to help solve problems or make something more accessible. Generally, consists of electronics and processors and software (Productions, 2018).

### **1.7.4 Learners with barriers**

Learners with barriers to learning and development are those who experience learning difficulties which make it difficult or impossible for them to learn (APA, 2013). These difficulties effectively may arise from a range of factors such as psychosocial, physical disruptions cognitive difference is particularly life experiences or socio-economic deprivation (APA, 2013).

### **1.7.5 ADHD**

Characterised by hyperactivity attention-deficit and impulsivity behavioural manifestations (American Psychiatric Association, 2013).

### **1.7.6 Special schools**

Special schools are schools which primarily focus on learners with high-intensity needs on either part-time or full-time basis (DoBE, 2018). These schools vary as there is a special school which deal with mild intellectual difficulties, physical difficulties and significant intellectual difficulties (DoE, 2001). These schools are meant to become resource centres equipped to aid learners who have presented with the need for high-intensity support needs and can provide a variety of support services to ordinary and full-service schools in the neighbouring area (DoE, 2001; DoBE, 2018).

### **1.7.7 Remedial school**

Remedial schools form part of the special needs sector, they are independent schools providing for the needs of learners facing barriers to learning who need extra support (Japari School, 2018). They provide medium to high levels of support (Weeks, 2003). They cater to learners who find the basic mechanics of mathematics, writing and reading a challenge (Japari School, 2018). Remedial schools are aimed at learners who fall behind age-appropriate norms in these fundamental skills (Japari School, 2018). This is despite having an average/ above average intellectual abilities. (The Understood Team, 2019; Japari School, 2019; Japari School, 2018).

### **1.7.8 Private or independent school**

A school not owned by the government, an independent school supported by the payment of fees of the learners (Merriam-Webster, 2018). South African Schools Act (1996), legislated two categories of schools: public and independent. 'Private' and 'independent' interchangeable, but

with different emphasis. Independent schools must comply with national laws and policies, education regulations, registration and accreditation. The independent schools are privately owned, governed by boards reflecting this ownership. Independent schools are independent of direct management by the education department (Nuttall, 2017).

### **1.7.9 Government (public) school**

Owned and administered by the government (Merriam-Webster, 2018). Public schools are defined as state-controlled and state-funded, owned, managed through education departments. State-controlled and managed through education departments means that the school consists of the following: School governing bodies which defines strategies and provides operational

oversight. The school is State-owned and funded this means that depending on learners' circumstances and the school: some schools require no fee and are entirely state funded. There are other schools which require fees payable in addition to state funding. The land that the school is on is either State-owned schools on private land (Nuttall, 2017).

#### **1.7.10 Mainstream government (public) school**

These schools are general schools. They have general classrooms and cater to the average range of learners (DoE, 2001).

#### **1.7.11 Full-service schools**

These schools are seen as mainstream schools which cater for learning barriers. They were created by the policy of inclusive education which states that all learners have the right to have an education with ordinary learners in an ordinary environment (DoE, 2001).

#### **1.7.12 Applications**

Apps is an abbreviation for the word applications. Apps are software programs which are found on mobile devices such as smartphones and tablets, such as iPads. Apple Inc came up with the term when in 2008 they released the App store (Productions, 2018 ).

#### **1.7.13 Tablet computers a tablet or tablet PC**

A portable computing device which has a touchscreen. The touchscreen is the primary input device it does not need a keyboard or mouse, for example, iPads (Productions, 2018 ).

#### **1.7.14 iPad**

An iPad is a computer in the form of a tablet with a touchscreen. It is bigger than a cell phone but smaller than a computer. It runs the Apple iOS. It is having the capability of having different apps loaded onto it (Productions, 2018 ).

#### **1.7.15 Touchscreen**

The primary input device that required a person to give the input directly through the screen. This is generally associated with tablets and smartphones (Productions, 2018 ).

### **1.8 PROGRAMME FOR THE STUDY**

Table 1.2: Programme of the study

Chapter 1	The proposal, which included the background, rationale, problem statement, summary of research methodology and design, purpose, theoretical framework and classification of terms
Chapter 2	Literature review on different aspects and diagnoses of ADHD, support needs, and the use of MLT's to support learning in remedial education.
Chapter 3	A detailed discussion of the research methodology and design of the study
Chapter 4	A detailed discussion of the main findings from the data-analyses of the study.
Chapter 5	Summarising of findings, conclusions, recommendation and critical reflection on the study.

## 1.9 Conclusion

This chapter discussed the background of the study, motivated and conceptualised the problem statement, and stated the aims of the study. The theoretical framework was presented, and a tabular representation of the research design and methodology was presented. The outline of the chapters of the study is presented in Table 1.2 below.



## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 INTRODUCTION**

This section looks at literature related to MLT as a supportive device for learners presenting with ADHD within a Foundation Phase medical school. In this review of literature, there will be an explanation of the South African Educational landscape, which will include explanations of inclusive education, how remedial education fits in. Once these contexts are established there will be a discussion about the learners found in these contexts, Namely learners with Neurodevelopmental disorders. ADHD is identified as one of the most common neurodevelopmental disorders. Furthermore, this section will look at theories related to ADHD and how to support these learners. Looking closely at research that has been done and where there is a need. This will guide the discussion to the need for new and innovative means of support which relates to MLT. MLT will be defined and relevant research will be discussed related to how it could be used as a supportive tool. The associated apps and who they are used will be discussed. This will identify gaps in research and support the need for this current study.

With all this in mind, it is nice to start this section off with a quote from Schutter (2018), which reminds us that we research and look into the research to make our education system better. To find means to support diversity and create new and innovative ways to meet the needs of learners within our education system no matter what barriers they may face. We come to understand that all learners are capable we just need to give them access.

Students who learn differently are just as capable of being the engineers, doctors and entrepreneurs of the future, the pioneers who will try something new because ... why not? Far from being a hindrance, their barriers can be their greatest assets – providing them with an ability to see the world differently from their present, sometimes quite literally. Although these children still need firm boundaries to structure their learning, I believe it is time we start shifting our thinking to celebrate learners who think in non-linear ways and recognise what they are truly capable of. (Schutte, 2018, p. 6)

### **2.2 INCLUSION**

The education landscape is changing and looking for new and different ways of creating a knowledge base that is reflective of the population's beliefs and understanding. There is a view that there needs to be a change in how we teach and how we understand knowledge itself. In other words, how and what we impart needs to change (Oelofsen, 2015). In 2001 DoE put in



place a policy that was meant to allow learners to access inclusive education by 2021 ( DoE, 2001). Before 1994 the education system in South Africa was exclusive to a specific minority (DoE 2001; DoE 2014). Meaning that learners who were not white did not have access to quality education. Beyond this learner who had special needs were removed from mainstream schools and placed in a special school, segregating these learners (DoE, 2001). The EWP6 was created to include all learners within school regardless of their barriers to learning (DoE, 2001). At the time this document was created it was estimated that there were 280 000 special needs learners not attending school (Japari School, 2018).

The teaching environment is not merely changing what is taught, but rather, understanding the importance of how it is taught. Inclusive education looks at ways of including learners in the learning environment using a different method of providing access to the curriculum, which may include changing how concepts are taught ( DoE, 2014; DoE, 2018). South African Department of Education stipulates guidelines for all institutions to be inclusive, which is outlined by the *EWP6 (DoE, 2001)*. There needs to be an acknowledgement of the fact that all learners can learn and that all learners need support (DoE, 2001).

There is a long history of inequality in South Africa, which is also seen in the education system. Learners were marginalised and not given access to learning opportunities because of their colour or other barriers. “statistics n 2001 show that only about 64,200 learners with disabilities or impairments are accommodated in about 380 special schools.” (DoBE, 2001, p. 2). Currently, there are approximately 25 500 schools in South Africa and 24 000 are government schools (Japari School, 2018). There are only 900 government schools that accept learners with barriers to learning. This includes full service and special needs school (Japari School, 2018). Indicating that approximately only 4 % of these learners are being catered for (Japari School, 2018). This means that not all learners with barriers to learning and development have access to the curriculum and the help and guidance they need (DoE, 2011; Japari School, 2018).

Our Constitution, Act 108 of 1996, highlights the importance of human dignity, equal human rights and freedom. Section 1 A states that we all have the responsibility to build a caring society for all South Africans(DoE, 2001). The 21<sup>st</sup>-century training and education system have the special responsibility to implement these values to ensure that learners with or without barriers are included and can reach their full learning potential (DoE, 2001).



The guiding principles of inclusivity are: to accept and respect all learners. Through this respect to enable the education system and methods of instruction to meet the needs of all the learners. Learners are part of a system that interacts to provide them with an education (Wits School of Governance, 2016). This system includes the teachers, the curriculum, the parents, the school management team and the community at large (Wits School of Governance, 2016). How all these role players interact impacts on the learners learning and how the learners are educated and the quality of that education ultimate impacts on the parents and community at large. Thus, there is also a clear understanding that learning is impacted by the education system (Wits School of Governance, 2016; Sejanane, 2014).

Learning occurs at home in communities and is impacted on by age, language, ethnicity, culture, class and disability (DoE, 2001; Sejanane, 2014; Wits School of Governance, 2016). The key aspect of inclusion is the principal of empowerment and developing the individual learners' strengths to enable them to participate actively in the learning process – the understanding that the curriculum and content are essential and can either be an asset or a further barrier to learners (DoE, 2001). Minimising the barriers to learning and development has an influence on learners and is a crucial aspect of inclusion (DoE, 2001; Sejanane, 2014; Wits School of Governance, 2016).

Two main paradigms to inclusive education are noticeable in literature, namely the 'medical model', diagnosed with the DSM 5, and the 'social model', the interaction between key role players and the environment, which in the end impact on the learning environment as a whole and learners within that environment (Dreyer, 2017). Dreyer makes the point that these two paradigms are “‘conflicting’ in the sense that the medical model departs from the notion of segregation on medical terms, while the social model focuses on human rights and social justice issues” (Dreyer, 2017, p. 389).

The medical model is often also referred to as the 'deficit' model as it locates the problem within the learners and is based on 'diagnoses' and treatment of the individual to rectify the issue (Dreyer, 2017). It thus foregrounds difference and creates a perception that 'specialised' knowledge and skills are needed to assist such learners (Dreyer, 2017).

Honkasilta (2016), asserted that ADHD is not “‘treated’” appropriately. He continues to point out the negative impact that labelling and discussing an ADHD learner as inherently sick, broken or malfunction has on the learner (Honkasilta, 2016). Honkasilta (2016), refers to

research by Freedman 2016 saying that the label 'ADHD' asserted onto learner by the medical model categories them as having no positive characteristics, furthermore, they are discriminated against and segregated because of this label (Honkasilta, 2016). Labelling is seen as an individualistic discourse which is imposed on ADHD learners and has had a dramatic impact on the emotional and behavioural well being of these learners (Slee, 2014). Slee (2014), states that these learners are disengaging from the learning process. Schools are to focus on labelling the pathology and are not developing the education system itself to assist these learners. Honkasilta (2016), takes this a step further stating in his research that the hyper-awareness of the diagnoses 'ADHD' is inconsistent with the goals of inclusive education which should embrace diversity.

The social model focuses more on the systemic challenges and how these create an exclusion for learners who do not fit the expected norms (Dreyer, 2017). The understanding that learners are influenced by context and interactions with the environment around them is key to the development of methods of teaching that are relevant and supportive to learners (Dreyer, 2017; Sejanane, 2014; Wits School of Governance, 2016). The learner's needs need to be met where their need is, they need to build on the knowledge base they have, empowering them to further build their knowledge. Teaching needs to be flexible and adaptive taking into consideration different learning styles and needs of learners (DoBE, 2001). Honkasilta (2016), refers to Vehmas (2010), stating that special needs education is not a matter of empirical facts and diagnoses but rather making judgements of what will be good and valuable to learners. The core of inclusivity is to look at the board diversity within the classroom and find ways to respond to this diversity (Honkasilta, 2016).

In South Africa, EWP6 was implemented in 2001, implementation has been slow and challenging, which has seen only 4% of learners with barriers to learning being provided with inclusive education or special education placement (Japari School, 2018). Conway (2017), states that inclusive education is faced with the challenge that many of the schools are under-resourced which has a massive impact on the teacher's attitudes. These teachers feel a lack of support and Conway questions in her research whether these schools can be classified as inclusive as they are not meeting the learners at their need (Conway, 2017).

The South African education landscape needs change to support these learners and to provide the much-needed resources and support required (DoE, 2014; DoE, 2018; DoE, 2001; Mahlo, 2011). Independent schools have become an integral part of the South African education

system (Van Der Berg, 2017). Independent schools save the government between R140 000 and R240 000 on infrastructure and running costs (Japari School, 2019). These schools are run independently and are funded by the parents paying school fees. In recent years independent schools have become more prominent and are shaping the education system in South Africa (Merriam-Webster, 2018). Independent schools can meet the needs of learners facing barriers to learning who are often overlooked and fall through the cracks in a mainstream environment (Japari School, 2019).

Van Der Berg, Van Wyk, Burger, & Kotzé, (2017) refers to research by Dapprt and Hofmeyer (2015) stating that independent schools have grown from enrolling about 250 000 learners to about 500 000. This was seen as a 76% growth between 2000 and 2010. The governments schools growth during the same period was 1.4%. South African independent schools are also becoming more diverse and inclusive and are moving away from just serving the needs of the well off white minorities (Van Der Berg et al, 2017).

The importance of this sector and understanding, what is available to them and, how they are using resources, will be critical to the South African education system in the future. There is a clear picture from a financial perspective that the Independent schools are seen to have more resources at their disposal because of the fact that they are funded by school fees versus government schools who are primarily funded by the state (Nuttall, 2017; Van Der Berg et al., 2017).

Independent schools bring about the opportunity to meet the needs of learners with barriers to learning (Japari School, 2019). The of the Remedial schools are independent schools who are seen as institutions that look at ways to provide support to learners face obstacles in there learning ( Japari School, 2017). As discussed in Chapter One (see Section 1.7.8, 9, 10, 11) different types of schools will play specific parts in attaining the transformation of the education system to one that is more inclusive, developmental and positive in its approach. As the current study focuses specifically on a selected independent remedial school, the nature of remedial schools will forthwith be explained.

## **2.3 REMEDIAL SCHOOLS**

Remedial schools should accommodate learners with barriers to learning and form part of the special needs sector (Japari School, 2018). Learners in the special needs sector experience

different barriers to learning which requires varying levels of support (DoE, 2001; DoBE, 2014).

Low-level support would refer to a minor modification to the school environment to allowing learner access to the curriculum, which could include just adding a wheelchair ramp to the school environment (UNISA, 2018; Weeks, 2003). These learners intellectual ability is intact and the intervention needed is basic and preventative. Le Roux (2016), in her presentation to the teachers union, stated that this level is on policy and budgetary level, implementation of resources and infrastructure, 80% of learners with barriers need this form of support (le Roux, 2016). The moderate level of support refers to more adjustments being needed within the school environment and curriculum (UNISA, 2018; Weeks, 2003). These could include different seating arrangements, bigger print to read and learning to support extra lessons. Le Roux (2016), stated these learners have an average cognitive ability and are at high risk they need short term intervention which could include the work of transversal teams 15 % of the learners need this form of support. High-level support deals with learners who achieve at a below average to the low cognitive level (UNISA, 2018; Weeks, 2003). These learners need extensive modifications to the curriculum and the school environment to have access to the curriculum. Le Roux (2016), stated that this could include receiving occupational therapy, speech therapy, learning support therapy and modifying the curriculum level and content, use assistive technology and need specialist teachers, 5% of learners require this form of support. These learners tend to have more than one barrier to learning (UNISA, 2018; Weeks, 2003).

Remedial provide medium to high levels of support (Weeks, 2003). They cater to learners who find the basic mechanics of mathematics, writing and reading a challenge (Japari School , 2018). Remedial schools are aimed at learners who fall behind age-appropriate norms in these fundamental skills (Japari School , 2018). This is despite having an average/ above average intellectual abilities. (The Understood Team, 2019; Japari School, 2019; Japari School, 2018).

The goal of remedial schools is to give learners the support they need in an environment where the learners are not faced with segregation and stigma attached to their difficulties (Japari School, 2018). Japari School (2018) states the following: ‘The remedial context is seen as one where support is provided within the school setting. There is no need for an extra lesson. The staff at a remedial school is seen as trained and equipt to meet the needs of learners facing barriers to learning. The learners also get individualised education plans and are given

specialised attention. These are all areas that are needed to support these learners which is not currently being met in the mainstream and full-service environments.’

Remedial schools are seen as playing an essential role in the 21<sup>st</sup> century South African education system (Japari School, 2019). These schools consist of specialised professionals that work in their multidisciplinary teams providing specialised support to learners. These professionals’ knowledge and specialised programmes and methods can later be accessed to assist learners in other institutes like full-service schools (DoBE, 2001; DoBE, 2018). There is a vast amount of knowledge within these schools of what works and does not work; how differentiation in the curriculum has worked in certain instances and where it has not worked; what works for some learners with specific needs and what does not? These remedial schools can assist and save the department of education money and beyond that, the knowledge and information that is gained within these institutions can become integral in the progress of inclusive and education as a whole in South Africa (Japari School, 2019; Nuttall, 2017; Van Der Berg et al., 2017).

Statistics South Africa states that there were 119 403 learners as of 2016 in special schools. This was an increase of 2 899 learners between 2015 and 2016 (DoBE, 2016). There were 47 769 learners in Gauteng alone in special schools, which comes in first (DoBE, 2016). This has increased by 2 765. The second province was 32 783 learners less than Gauteng (DoBE, 2016), showing that the number of learners in special schools is increasing. In Gauteng alone, we see that the number of learners experiencing barriers is double that of any other province.

We need to look at the specific difficulties these learners face to be able to meet their needs. It is, therefore, necessary that one should be clear about who these learners are, who may experience barriers to learning.

### **2.3.1 Learners with barriers to learning and development**

The South African Schools Act 84 of 1996 uses the term “learners with special educational needs” when referring to learners who need more than ‘general’ academic support. This phrase implies that these learners have needs that are different from those of the average learner and that they require special attention. These needs may take various forms (Weeks, 2003). A more recent term used by National Commission on Special Needs in Education and Training (NCSNET) and the National Committee on Education Support Services (NCESS) refers to these learners as learners presenting with barriers to learning and development rather than

learners with special needs. This shift is to remind us to focus on how learners experience barriers and how we can decrease their impact on learners. This is seen as a positive approach to including and empowering these learners (Weeks, 2003).

These barriers manifest themselves as sensory, intellectual, physical and neurological impairments (Landsberg, 2016). Developmental barriers refer to a learner whose development does not correspond to that of an average learner in that particular age group (Landsberg, 2016; Weeks, 2003; UNISA, 2018). Learning barriers can be classified as difficulties when trying to master learning tasks which most other learners that age can manage (Landsberg, 2016; Weeks, 2003; UNISA, 2018). Learners with emotional barriers frequently develop learning barriers as well as eventually behaviour barriers (Landsberg, 2016; Weeks, 2003; UNISA, 2018). Behavioural barriers are those involving unacceptable conduct. Many learners with one of these barriers tend to experience one of the others as well (Landsberg, 2016; Weeks, 2003; UNISA, 2018).

These barriers to learning can also be defined from a medical model point of view through the DSM-5.

## **2.4 NEURODEVELOPMENTAL DISORDERS**

In the DSM-5, the central aspect that is relevant to this research is neurodevelopmental disorders, which occur during the developmental stages and affect a learner's ability to learn (APA, 2013).

Neurodevelopmental disorders are some of the most common, with the EPA (2013) and Vargo (2015) stating that plus, minus 15% of children in the United States and the world population in general, are affected by neurodevelopmental disorders between the ages of three and 17. In South Africa, in 2015 there were 116 504 and in 2016 it was recorded as 119 403 learners in special schools and of these learners, there were 99 195 with neurodevelopmental disorders in 2015 and by 2016 that number increased to 102 295 (DoBE, 2016). that is about a 5% increase in the number of learners reported in schools with neurodevelopmental disorders in 1 year.

There are many different forms of developmental disorders that learners can experience according to the medical model and to the DSM-5. The medical model can be defined as the process of identification of symptoms that are associated with a biological illness, meaning that genetics, neurotransmitters, neurophysiology, neuroanatomy or physical causes or an accident



etc. could be the cause of the “illness” (Landsberg, 2016; UNISA, 2018). The medical model uses diagnostic criteria in the DSM-5 to make a diagnosis. This diagnosis is then submitted to the medical aid for claiming using the International Code for Diagnoses (ICD10) (APA, 2013).

The developmental period can, be associated with learners entering Foundation Phase schooling, and are associated with barriers in personal, social, and academic functioning (APA, 2013). Neurodevelopmental disorders are primarily seen as impacting on neurological systems of the brain (APA, 2013). The examples of these are attention-deficit/hyperactivity disorder (ADHD), autism, learning disabilities, intellectual disability, conduct disorders, cerebral palsy, and impairments in vision and hearing. These can manifest in barriers in language, speech, motor skills, behaviour, memory, learning, or other neurological functions (APA, 2013; Elphick, 2015; EPA, 2013).

Learners can be diagnosed with any number of neurodevelopmental disorders. They can also go undiagnosed for years. There is an understanding that the sooner a learner receives help and support the more chance of success there is (Barkley et al., 2006; Cota, 2008; Decaires-Wagner & Picton, 2009; Parker, 2001; Tree, 2008). Understanding the disorders will help to understand the learners. Often, they present as difficult or naughty, but they have a barrier preventing them from accessing the curriculum like other children their age. (Mourshed et al., 2010; Verbeek, 2014).

Many special schools have learners with neurodevelopmental disorders and other barriers. The disorder with the highest prevalence is ADHD. According to the EPA (2013), approximately five per cent of the population is affected by ADHD. Plus, minus four per cent of U.S. children have ADHD (APA, 2013; Barkley et al., 2006; Daly et al., 2015; Decaires-Wagner & Picton, 2009; DoE, 2016; Elphick, 2015; EPA, 2013). In South Africa, according to the Department of Basic Education (2016) within special schools in, 2016, there were 2 978 with ADHD and more than half of these were found in Gauteng (DoE, 2016). This does not take into consideration the number of learners that remain undiagnosed.

Learners presenting with ADHD may then be considered as one of the more prevalent neurodevelopmental disorders which teachers have to deal with on a daily basis, even more so in the context of remedial schools where the expectation is that the school and staff are equipped to deal with such learners. Understanding the disorder, therefore, becomes imperative.

### **2.4.1 ADHD as a neurodevelopmental disorder in South Africa**

The South African education system with its focus on redress of inequities and quality requires a clear understanding of how learners with diverse abilities and needs from multiple backgrounds can be accommodated successfully. In essence, it requires a good understanding of how learners' learning is affected and how to support these learners to learn in ways that apply to each learner.

There is extensive research on the prevalence and diagnoses of ADHD, which clearly shows that it is highly prevalent and a problematic barrier that impacts the functioning of learners to reach their full potential (APA, 2013; Barkley, 2006; Barkley et al., 2006; DoBE, 2015). Most of the research mentioned above originates outside of South Africa, which may indicate a lack of local research concerning ADHD in the South African context. The apparent dearth of research also extends to the area of intervention, inclusion and how to better support these learners presenting with ADHD. In this respect, Topkin, Roman and Mwaba (2015, p. 7) recommends further research: "a better understanding and information about ADHD interventions that may help, and the amount of support provided to teachers in helping these learners would be useful to include in future studies. It would also be helpful if the Department of Basic Education had this knowledge to help all learners within the system better". Assisting and supporting learners is further extended by suggesting the need for more information on academic interventions for learners with ADHD. Finding new ways of helping these learners access the curriculum, may help learners outside the special school's environment access the curriculum (Barkley, Mash, & Wells, 2006; Landsberg, 2016; Nelson, 2007; Parker, 2001).

Teachers are expected to support learners with ADHD academically and socially in the school. To be able to achieve this, teachers would need more information and guidance when it comes to the barrier of ADHD (Nel, 2014; Safaan, El-Nagar, & Saleh, 2017; Youssef, Hutchinson, & Youssef, 2015) as well as how to best support these learners. Research sourced though, show that there is an apparent lack of knowledge and information about ADHD and how to support it in South Africa when teacher opinion on ADHD and its impact in the classroom was the focus (Kern et al., 2015; Sikotane, 2016).

Within the South African context, the number of learners with ADHD will increase as more learners are diagnosed, and we learn more about the challenges these learners face in schools (Decaires-Wagner & Picton, 2009). As these learners are 'identified' more, teachers will



undoubtedly be challenged to support them amidst the ever-changing South African teaching landscape. The role of special schools such as remedial schools, cannot be underestimated in this regard (Japari School, 2019). Special schools are schools with focused learning for learners with specific learning barriers, such as ADHD (DoBE, 2016). The province with the most learners requiring special schools is in South Africa in Gauteng. These schools in Gauteng also have the most ADHD learners in comparison to the rest of the country (DoBE, 2016). These special schools act as resource centres and the information gathered within them will help the department, communities and surrounding schools to understand better how to support learners with barriers to learning, reach their potential.

## **2.5 DEVELOPMENTAL THEORIES AND ADHD**

The understanding of developmental theories is key to this study as ADHD, which is the focus of the study, is identified as a developmental disorder (APA, 2013). This means that there are certain aspects of development that need to be understood to make sure that support can be provided in an appropriate way, meeting the needs of the learner. Different theories impact a learner's ability to learn that can be associated with different forms of development, mainly the cognitive, social, emotional and physical development of a learner (Pound, 2006). The theories presented here, are by no means the only theories of development that are important but have been selected as they relate best to the current context. These theories need to be carefully considered and kept in mind for practice when dealing with learners who present with ADHD.

According to Jean Piaget intellectual development is continuously constructed and reconstructed by way of cognitive processes such as assimilation and accommodation (Piaget, 1977; Berk, 2013). Piaget proposed that cognitive development proceeds through four universal developmental stages, namely: The Sensorimotor Stage: Babies develop their cognitive processes merely through the body; in the process of moving their extremities, babies allow things to occur accidentally and repeat this occurrence, therefore the experiment begins, creating sensorimotor premises, and participating in other deliberate behaviours to manipulate the world around them (Berk, 2013; Piaget, 1977). During the developmental age of between two to about seven – The Preoperational Stage occurs: young learners start to create internal pictures. They use language to characterise activities. They represent thought through drawing, play, and other means. This stage can be classified as the transitional stage, during which young learners are using a variety of cognitive tactics to comprehend the world around them (Berk, 2013). During the developmental age of between seven to eleven, the Concrete

Operational Stage occurs – more specifically between the ages of five and seven, learners start to think about the world that presents as more rational thought. They look to the adults around them to answer these questions. Learners develop the skill to classify, categorise, put in series and participate in thinking both forwards and backwards, understanding what could happen and what did happen. Learners who reach the concrete operational thinking stage can participate in formal reading and numeracy education (Berk, 2013). During the developmental age of between ages eleven to adulthood, The Formal Operational Stage occurs – learners attain this stage in early adolescence, becoming capable of “thinking about thinking”. They therefore no longer need concrete materials in order to think. They are able to function purely from the use of symbolic language (Berk, 2013).

Learners, therefore, increase understanding from a simple concrete concept to a more complex concept. Piaget believed that you cannot just teach through reinforcement or practice but rather through a process of construction and scaffolding of knowledge (Pound, 2006; Vygotsky, 1978). The ADHD learner struggles with abstract thinking and the development of higher more abstract thinking, therefore the teaching they require should be based on the process of working with concrete and sensory manipulation and then later moving toward the more abstract (Barkley, 2006; Barkley et al., 2006). ADHD learners thus learn better with their senses. Piaget spoke about the different domains of development. The physical domain is associated with body size and appearance. Emotional and social development are associated with the ability to communicate appropriately and to understand oneself and the relationships one has with others; it also links to behaviour and reactions to situations. Cognitive development is associated with the intellectual ability which links to language, memory and knowledge (Berk, 2013). Teachers have the ability to influence the cognitive development of an ADHD learner (DuPaul & White, 2006).

This means that development occurs within certain areas. Not only does a child grow physically but they also have natural changes that occur in the emotional, social and cognitive domains. Therefore, understanding when these changes should occur and in which order helps to determine if the learner is functioning at the norm for their age (Berk, 2013). It is also vital to understand the learner as a whole and not just look at the domains exclusively. ADHD learners need to be understood holistically and when they are supported it is important to support them in ways that look at all their domains and where they are functioning and developing well and

where they need support. Providing support for these learners where their needs are, is key to their success (Barkley, 2006; Barkley et al., 2006; Decaires-Wagner & Picton, 2009).

Vygotsky believed that social interaction was of absolute importance in the development of cognition. He posited that learners predominantly learned through social interaction with others in the specific context and culture and that social learning precedes development (Pound, 2006; Vygotsky, 1978). According to Vygotsky's theory (1978), learners learn through play, and everyday experiences help them to build on their existing knowledge through social interactions. Learning is therefore continually building on old knowledge. He believed that language is imperative to cognitive development and that the internalisation of language needs to take place through social interaction and development (Pound, 2006; Vygotsky, 1978). Vygotsky coined the 'elementary mental functions', namely attention, sensation, perception and memory as the 'tools' to adapt successfully to a socio-cultural environment. Interaction with these allows elementary functions to develop to 'higher mental functions' to adapt intellectually (Berk, 2013; Zaporozhets, 2002). When learners with ADHD struggle with the development of knowledge they would also struggle in the classroom setting where cognitive development is the main focus (Parker, 2006). The learners with ADHD find it challenging to develop language skills and find the tools of attention, perception and memory, a challenge. In turn, they find the development of higher mental functions difficult (Barkley, 2006; Barkley et al., 2006; Daly et al., 2015; Decaires-Wagner & Picton, 2009). Vygotsky also saw how vital it was that learners learn at their own pace and understanding (Berk, 2013; Pound, 2006). This is key to the success of any intervention being effective with an ADHD learner, as they need to be given the space to learn at their own pace and level (Barkley et al., 2006; Decaires-Wagner & Picton, 2009). The content cannot be too hard or too easy, it must be just right. Vygotsky coined this as the 'zone of proximal development', where a learner still needs assistance to develop from a lower to higher form of mental functioning. Teachers become crucial in this process where learners, at one point, are not able to complete a task independently, but with the assistance of the teacher through demonstration and scaffolding, can move to a more independent level in the future (Pound, 2006; Vygotsky, 1978). This is important to remember with ADHD learners as the support of the teacher and the scaffolding process, as well as understanding the learner's zone of proximal development, will enable them to be more successful at an academic level (Landsberg, 2016).

The “‘Zone of proximal development’ which Vygotsky described as the gap between what a child can do alone and what they can do with the help of someone more skilled or experienced, who could be an adult or another child” (Pound, 2006, p. 39). The *White Paper 6* (DoE, 2001) talks about all children being able to learn, but that all need help. There needs to be an understanding of where the child is in development and where the zone of proximal development is to know where and how to help them.

Vygotsky highlighted the significant role of play in the development of abstract thought. He emphasises the importance of classification and construction of concepts. He understood development to be supported by social interactions and the world around us (Pound, 2006). He also spoke of the importance of language as the foundation for the formation of abstract thought (Pound, 2006). A learner with ADHD struggles to acquire language and will, therefore, struggle with their cognitive development (Barkley, 2006; Decaires-Wagner & Picton, 2009). ADHD learners need stimulating environments where they can interact with the environment to acquire and construct concepts appropriately.

Erikson’s work describes stages of development that include the whole human lifespan, beginning from infancy to old age (see Figure 2.1.5). Erikson’s stages provide an understanding of the kinds of tasks we are faced with as we grow older. Erikson believes that each stage of development comes with its own challenges. He calls these crises. Erikson talks about the crises of the ego challenging a person’s individual identity. The successful development of the personality hinges on overcoming these crises (Fleming, 2018). One of the aspects of development that ADHD learners struggle with or that they could be faced with is that they do not trust the world around them. They are faced with the question – am I ok with me? We know that they are impacted in the classroom and can become frustrated and demotivated which also means they can become paralysed by the fear of rejection and getting or doing things wrong. They struggle to know where they fit into the world. These learners need to be guided and supported through their crises (Erikson, 1968; Fleming, 2018).

Part of a learner’s development is where they develop through their environment, and if learners are not supported currently through their environment, their development becomes more challenging. When looking at Maslow’s hierarchy of needs we see that learners who are developing a need to be able to first and foremost have their physical needs met; they can be supported through creating a safe environment where there is no judgement, and they feel safe to make mistakes and to learn and grow. This also moves to the next need of making sure that

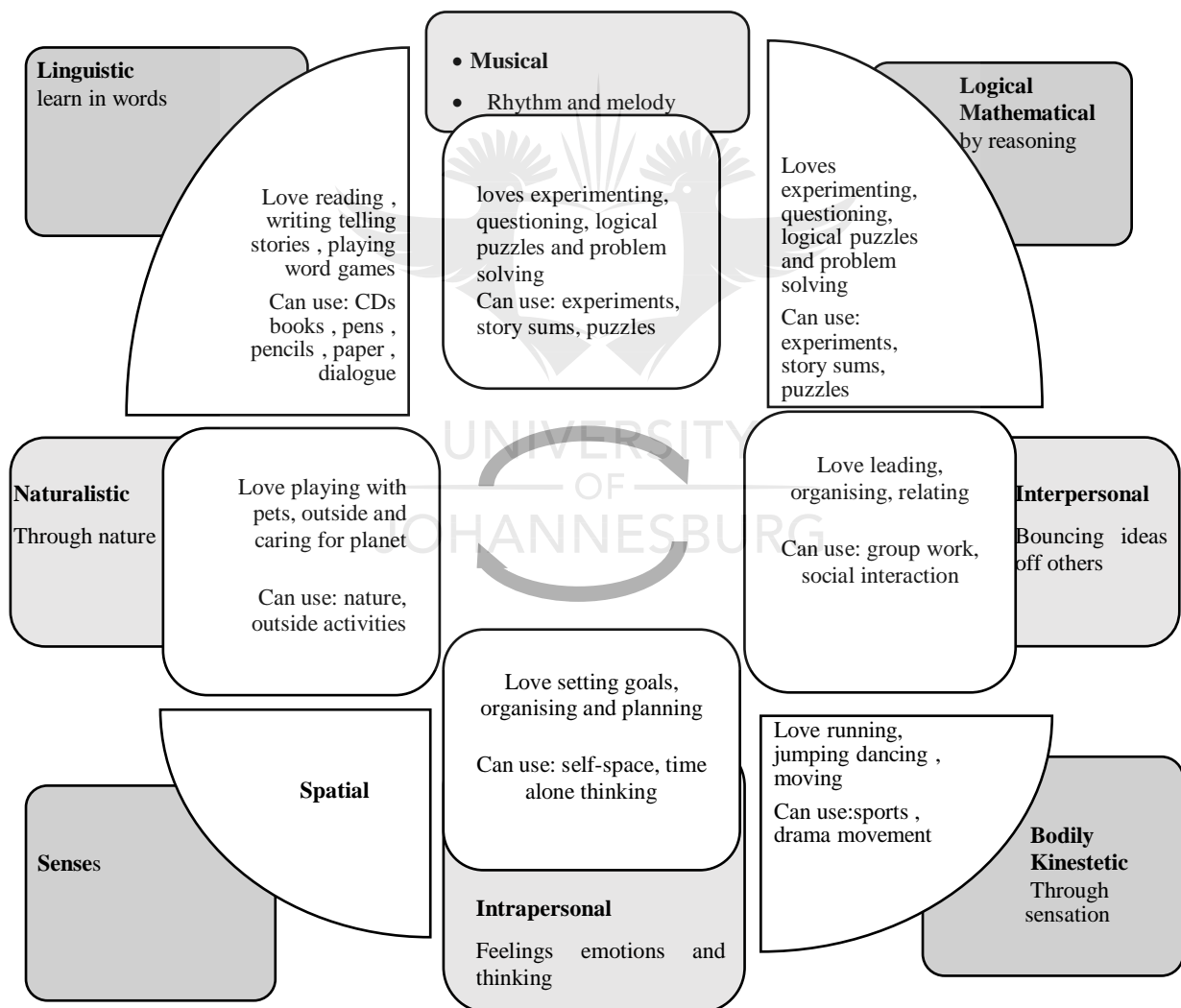
learners are loved and feel accepted no matter what their difficulties are. This also links very closely to the assumptions stipulated in the WP6. ADHD learners need their self-esteem built up because as we have read, they face many challenges in the classroom and need environments where they can be supported and accepted (Berk, 2013; Pound, 2006).

**Table 2.1: At what age according to theories do cognitive, emotional and social development take place (Berk, 2013; Pound, 2006).**

	Erikson	Piaget	Vygotsky	Maslow's Hierarchy of Needs
	<b>Psychosocial</b> Develop through Age	<b>Cognitive</b> Develop through Age	<b>Social development</b> Develop through Age	<b>Develop through Environment</b>
<b>0</b>	<i>Can I Trust the World?</i> <b>Trust vs Mistrust</b>	<b>Sensorimotor period</b>	<b>Totally dependent; start to respond to external stimuli</b>	Physiological needs <b>His physical needs were not being met he has been moved around</b>
<b>1</b>	The client does not trust the world		<b>Crisis!</b>	
<b>2</b>	<i>Is It OK to Be Me?</i> <b>Autonomy vs Shame and Doubt</b>		<b>Must start speaking and walking; adults still meet your needs</b>	
<b>3</b>	He has substantial esteem issues he not sure if it's ok to be him	<b>Pre-operational stage</b>	<b>Crisis!</b>	<b>Safety needs</b> He has had no continuous form of safety
<b>4</b>	<i>Is it OK for Me to Do, Move, and Act?</i> <b>Initiative vs Guilt</b>		<b>Ability to act contrary to inclination (self-control begins)</b>	
<b>5</b>	He can be paralysed by fear and rejection feels guilty about things he cannot control		<b>Crisis!</b>	
<b>6</b>	<i>Can I Make it in the World of People and Things?</i> <b>Industry vs Inferiority</b>			
<b>7</b>	Struggles with where he is going biggest wish are so that his family will be successful and ok. He wants to get a job			
<b>8</b>				
<b>9</b>				
<b>10</b>				
<b>11</b>				
<b>12</b>	<i>Who Am I and What Can I Be?</i> <b>Identity vs. Role Confusion</b>	<b>Formal operational stage</b>		<b>Love/Belonging Needs</b> He has moved away because dad was back, he does not know where the hi place is
<b>13</b>		<b>Concrete operational</b>		
<b>14</b>				
<b>15</b>				
<b>16</b>				
<b>17</b>				
<b>18</b>				
<b>18 – 40</b>	<i>Can I Love?</i> <b>Intimacy vs Isolation</b>			
<b>40 – 65</b>	<i>Can I Make My Life Count?</i> Generativity vs Stagnation			
<b>65 +</b>	<i>Is it OK to Have Been Me?</i> Ego Integrity vs Despair			<b>Esteem Needs</b>
				<b>Self-Actualisation Needs</b>

Gardner's theory of multiple intelligences points to the importance of understanding and knowing how learners learn and where their strengths and weaknesses are (Armstrong, 2009).

This brings about the understanding that each learner has a learning style and that learning in all the learning styles or in the learning style where one's strengths lie, will improve ones learning experience (Venter, 2013). Multiple intelligences in the classroom can present as linguistic learning through words; logical/mathematical learning through problem solving; spatial learning through images and pictures; bodily and kinaesthetic learning through touch and sensation movement; musical learning through rhythm and melody, interpersonal learning through bouncing ideas off of one another and interactions with one another; intrapersonal learning through the setting of goals and making sure one learns through feelings, planning and organising; and naturalistic learning through nature and being outside interacting with the environment (Armstrong, 2009). An example of what is needed and what this intelligence requires are referred to in the table below extracted from Armstrong (2009).



**Figure 2.1: Multiple Intelligences in the class (Adapted from Armstrong, 2009)**



Finally, all development is contextual in nature. Underlying Bronfenbrenner's theory is the assumption that development takes place when a person interacts with their environment. The theorist Urie Bronfenbrenner believes that learners need to be better understood as a whole person. They need to be looked at from a holistic perspective to be able to understand how they learn and what works for them as individuals. There needs to be a special consideration of the learner's environment, social context, and interactions. These define who the learner is and how they learn. Sometimes what works for the class does not always work for individual learners, which means if we do not consider this, we are not inclusive, and learners are not getting access to the curriculum as they should (Landsberg, 2016).

Teachers, therefore, need to be able to create environments that provide information, and repetition reinforcement in the form of multisensory inputs so that all learners are reached and included whether they are an auditory, visual, kinetic, or tactile learner. "The most important way of addressing barriers arising from the curriculum is to make sure that the process of learning and teaching is flexible enough to accommodate different learning needs and styles" (DoBE, 2001, p. 21).

## **2.6 ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD)**

For the purposes of this study, the focus will be on one of the most common neurodevelopmental disorders, ADHD.

Attention-Deficit/Hyperactivity Disorder (ADHD) is the most common psychiatric disorder present in learners during the developmental stages, which range from ages three to 17 (Barkley et al., 2006; Cota, 2008; Hovie, 2012), and is known to impair social and academic functioning. Although some learners remain undiagnosed (EPA, 2013), Erasmus a South African clinician, states that "Clinicians are seeing an increase in the number of children who are suspected to have ADHD" (Decaires-Wagner & Picton, 2009, p. 2). Thus, a greater awareness of this disorder and its impact is steadily becoming more prevalent and calls for a need for continued understanding and knowledge of this disorder to help learners reach their potential (Landsberg, 2016).

The DSM-5 classifies ADHD (Attention-Deficit/Hyperactivity Disorder) as a neurodevelopmental disorder and defines it by criteria associated with impaired levels of inattention, disorganisation, and hyperactivity-impulsivity. Inattention and disorganisation include the inability of these learners to stay on task; they can present as not listening, they

tend to be disorganised and will continuously lose materials. These impairments are at levels that are inconsistent with their age or developmental level (APA, 2013). The statistics stated in the DSM-5 worldwide is that five per cent of children have ADHD. To be diagnosed with ADHD the symptoms need to be persistent for more than six months and have an adverse effect on development in comparison to other learners of the same age.

### **2.6.1 Learning challenges for ADHD learners**

Furthermore, research indicates that teachers need to be aware of “what ADHD is, what difficulties these learners may have in the classroom, and what interventions there are available to help these learners” (Nelson, 2007, p. 12).

The experience ADHD learners have within a classroom can be frustrating. Attention and concentration are the ability to focus on a task or to filter information and can be very daunting for a learner presenting with ADHD (Beauchaine & Hinshaw, 2013). Beauchaine & Hinshaw (2013) stated that within the school environment, children are required to pay attention in class, they need to listen when other children are talking, They need to keep track of their materials and equipment and they also need to wait their turn. These are all aspects that ADHD children find difficult (Beauchaine & Hinshaw, 2013).

“Executive functions have been defined as those capacities that enable a person to engage successfully in independent, purposive, self-serving behaviour” (Rommelse & Buitelaar, 2008:17; Parker, 2001). Rommelse & Buitelaar (2008), state concentration and attention, therefore, originate within this executive function of learners by way of normal development where these things fall into place naturally and at an average time for a specific age group. With ADHD learners, this is not the case. In some instances, EEGs and brainwave research has been used in an attempt to clarify the issues of ADHD learners’ experience (Lenartowicz & Loo, 2014). Lenartowicz & Loo (2014), research indicates that there is a difference in children with ADHD, between their faster concentration brain waves and slower daydreaming waves in the brain. These differences are more visible with tasks that require more concentration and attention for example, when required to read (Decaires-Wagner & Picton, 2009). Children with ADHD will have slower concentration waves than non-ADHD learners – this makes concentration much harder for ADHD learners which means that they require more stimulation to hold and keep their attention in a classroom setting (Barkley, 2006; Barkley et al., 2006; Beauchaine & Hinshaw, 2013; Cota, 2008; Decaires-Wagner & Picton, 2009; Parker, 2001).



Although there are contentious viewpoints on the value of using EEGs and brainwave research, there appears to be some consensus that EEGs and brainwaves are not at the point yet where they can definitively be used to diagnose or assist learners with ADHD (Lenartowicz & Loo, 2014; Saad, Kohn, Clarke, Lagopoulos, & Hermens, 2015).

A significant percentage of ADHD learners are described as having specific difficulties with learning to read, with handwriting, and with reading comprehension (Barkley, 2006; Pavlidis & Giannouli, 2014). Parker also posits that “deficits in speech and language or perceptual processing (such as auditory or visual memory, association, or discrimination) may be more common in students with ADHD” (2001, p. 11). These difficulties are further echoed by Hovie who states that “students with Attention Deficit/Hyperactivity Disorder (ADHD) exhibit reading disabilities in the area of comprehension. ADHD and reading disability are two of the most common diagnoses of school-aged children and show lower than average reading comprehension with both groups displaying decreased academic motivation over time” (Hovie, 2012, p. 5).

Extensive research has been done on the link between ADHD and specific learning difficulties and dyslexia (Pavlidis & Giannouli, 2014). “Language serves many purposes in our lives and is central to educational achievement” (Decaires-Wagner & Picton, 2009, p. 49). We use language to communicate our needs, wants and feelings. It becomes a part of how we think (Decaires-Wagner & Picton, 2009; Pound, 2006). Reading is a language task that learners require to learn. Dyslexia can hugely impact an ADHD learner’s ability to acquire the skills involved with language and reading (Pavlidis & Giannouli, 2014). The development of basic language skills includes phonological awareness, vocabulary and comprehension which form the foundation of what then becomes reading. Reinforcing these skills is vital to reading development (Decaires-Wagner & Picton, 2009; Landsberg, 2016; Nelson, 2007; Parker, 2001). These difficulties can also present themselves in the form of specific learning difficulties, and these tend first to become apparent when the ADHD learner moves into the Foundation Phase and is required to learn the foundational skills (Mahlo, 2011; Nel, 2014; Nelson, 2007; Parker, 2006; Tree, 2008). The ADHD child needs this reinforcement more so than a child without ADHD because of their barriers in executive function (Barkley et al., 2006; Barkley, 2006).

There is also extensive research regarding the relationship between ADHD and mathematical ability (Lucangeli & Cabrele, 2006; Tooke, 2018). Learners presenting with ADHD are seen

as slower and less accurate in calculations than other learners their age. This ‘poor performance in accuracy’ may be associated with the previously mentioned symptoms of hyperactivity and distractibility (Lucangeli & Cabrele, 2006). These difficulties with mathematics are thus clearly related to “both the core behavioural symptoms of ADHD and associated executive functioning deficits (and) likely contribute to academic impairment” (Raggi & Chronis, 2006, p. 1).

### **2.6.2 ADHD learners need for support and new interventions**

Thirty per cent or more of children with ADHD repeat a grade in school, and 57% are placed in special education programmes (Tree, 2008). The creation of support methods for ADHD learners has been reviewed and there are a few methods seen as useful in supporting ADHD learners (Tree, 2008). These methods are seen as creating the opportunity for ADHD learners to respond. In a normal classroom setting the ADHD learner finds drill practice challenging as it becomes repetitive in nature (Barkley, Attention-deficit hyperactivity disorder, 2006; Decaires-Wagner & Picton, 2009). The challenge, therefore, is to find methods that support these learners and create opportunities to engage in active learning (Parker, 2006).

Johnston & Park (2015) stated that methods such as peer collaboration can be used, which reinforces the idea of one-on-one learning and uses both academic and social learning to support ADHD learner. Expanding on this notion is cooperative learning which creates a group setting where learners would be placed in a group and given a task. They would allocate roles to one another to achieve the said task. Using interventions like paired reading, playing board games, frequent redirection and selective seating arrangements, are all seen as techniques to manage ADHD learners within the classroom (Johnston & Park, 2015).

Johnston & Park (2015) and William and Mary Training & Technical Assistance Center (2017), present other interventions to support ADHD learners, namely behavioural management programmes, ranging from assertive discipline to positive rewards for positive behaviour and redirection. From a medical point of view, the use of pharmacological interventions is very prevalent in the reduction of ADHD symptoms (Johnston & Park, 2015; William and Mary Training & Technical Assistance Center, 2017). The most commonly prescribed medications are classified into two broad categories, mainly stimulants and non-stimulants. (Johnston & Park, 2015; William and Mary Training & Technical Assistance Center, 2017).

Placement and repetition, however, is not enough. The placement of learners with ADHD has been researched by looking at finding the best environment for them to find support (Tree, 2008). One such recommendation from the research is that learners with ADHD require a one-on-one learning experience, this being the ideal setting to assist them in their learning (Parker, 2001; Tree, 2008).

William and Mary Training & Technical Assistance Center (2017), suggests that computer-based instruction has been used in the past and increases opportunities for the ADHD learner to respond and actively engage in his or her learning. The immediate feedback allows for the accuracy to be improved and creates opportunities for drill practice in a new and innovative way (William and Mary Training & Technical Assistance Center, 2017).

Nelson (2007), research has further established the links between difficulties experienced by learners with ADHD and ideal methods on how to better manage and support the learning of these learners. In particular, the importance of individual attention, inclusive curricula and classrooms, meeting the child's needs and understanding their potential to grow, are highlighted as non-negotiables (Nelson, 2007). Individualising teaching and learning, particularly for ADHD learner, are thus required (Barkley, 2006; Pavlidis & Giannouli, 2014; Parker, 2006; Johnston & Park, 2015). It is therefore plausible that supporting learners with ADHD "requires an individualised intervention program adjusted every time to the child's specific psychoeducational needs" (Pavlidis & Giannouli, 2014:225). There is minimal research in South Africa Currently, especially linked to the support these learners need and there is a need to look at this more closely (Nelson, 2007).

## **2.7 South African support structure and need for support**

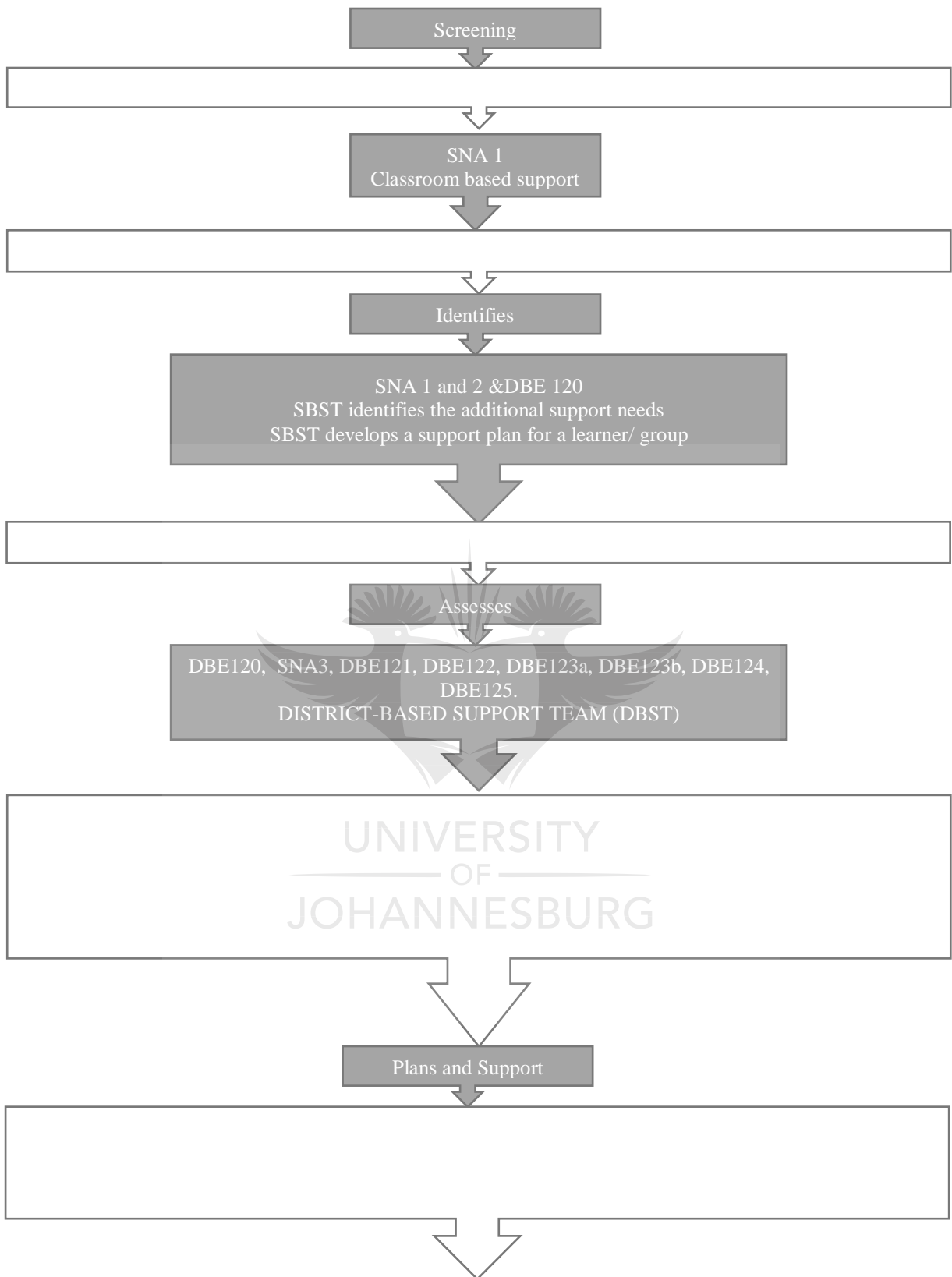
The Mandate within the education system in South Africa is to put White paper 6 into practice. "It is clear that some learners may require more intensive and specialised forms of support to be able to develop to their full potential. An inclusive education and training system are organised so that it can provide various levels and kinds of support to learners and educators." (DoE, 2001, p. 19). This means that supporting the learners and the educators are vital to creating an environment where learners have access to the Curriculum. We also know from the above that ADHD learners fall into the category of needing specific help in an individualised way (Pavlidis & Giannouli, 2014; Taylor, 2011).

### 2.7.1 SIAS

The Screening, Identification, Assessment and Support (SIAS) Policy (DoBE, 2014) document stipulates how to identify learners who are in need of support. It was previously the responsibility of specially qualified people in the education system to identify learners with barriers that tended to only occur in the special school domain (DoBE, 2014). The goal of the SIAS policy was to make sure that all schools put in place a process that was standardised for the Identification, Assessment and implementation of support for learners dealing with barriers to learning which was meant to enhance their participation and inclusion in their given schools (DoBE, 2018; DoBE, 2014).

National Professional Teachers Organisation of South Africa (NAPTOSA) (2018), stated that the following process is followed:





**Figure 2.2: NAPTOSA (2018), SIAS process**

The process discussed in the SIAS is the inclusive model that the Department of Basic education has put in place to try and help provide the necessary support to learners with barriers

to learning (NAPTOSA, 2018). The South African process has come to realise that learners are not just focused on as individuals but rather within their social context (Japari School, 2019). The goals of inclusive education and the SIAS process has seen many challenges and delays and though their goals are admirable have yet to be realised (Japari School, 2019). Independent schools are trying to meet the need of these learners (Japari School, 2018).

### **2.7.2 Support for ADHD**

There are many studies from different parts of the world which have found that teachers' knowledge is at best reasonable and in many cases, insufficient, requiring intervention (Youssef et al., 2015; Nel, 2014; Safaan et al., 2017). These also included the role of the teacher and the teacher's opinions on ADHD. There is a lack of research related to the use of an intervention with a specific difficulty that ADHD learners face academically (Youssef et al., 2015; Nel, 2014; Safaan et al., 2017).

Research indicates that teachers need support and guidance to implement inclusive policy as well as to provide appropriate support to learners with ADHD (Kern et al., 2015; Nel, 2014; Safaan et al., 2017; Sikotane, 2016; Topkin et al., 2015; Youssef et al., 2015). Research has found that ADHD learners suffer from academic challenges (Decaires-Wagner & Picton, 2009; McGrath, et al., 2011; Taylor, 2011). Many of the interventions out there focus on the systems of ADHD and do not assist in the creation of an environment that assists learners to access the curriculum (DuPaul & White, 2006).

“A teacher who views the child through a positive, strength-based lens believes in children's abilities, and resilience and what they can do” (Von Cziffra-Bergs, 2015, p. 3). Teachers need methods that can be adapted to meet the child on their level of understanding and scaffold their new knowledge, they need methods that work with learners multiple intelligences and help the learners learn in a way that is easy to understand for them. The learners need to be viewed holistically and their contexts need to be carefully looked at when finding methods that work.

“All individuals are born with the desire to communicate and to communicate in some way or the other” (Landsberg, 2016, p. 333). Giving learners the ability to access the curriculum and to understand the language around them gives them access to the world around them.

## 2.8 MOBILE LEARNING TECHNOLOGY

Information and communication technology (ICT) has enjoyed some different terms over the years. Namely computer-based learning, computer-based teaching, computer-assisted instruction, assistive technology and now ICT, each with a distinct meaning. Computer-based instruction is instruction delivered with or through computers (Tillman, 2003). Computer-assisted instruction is the use of computers to assist learners to learn at their own pace, providing immediate feedback, reinforcement, rehearsal and motivation to learners (Regan et al., 2014). Assistive technology is any product that is related to improving the function of access to normal life for learners with a disability (UNICEF, 2015). ICT is defined as an umbrella term that includes communication devices or applications, for example, radio, TV, cellphones, tablets, computers, networks, hardware or software satellite systems and so on (Sharma, 2015). The integration of information and communication technology (ICT) in education is therefore not a new concept and has been noted to be one of the significant challenges experienced by teachers in classrooms (Yusri & Goodwin, 2013). Teacher beliefs about their competence in utilising ICT in the classroom have been noted as an essential factor in their attitudes and hesitation to use ICT in the classroom.

ICT encompasses modern tools for knowledge sharing and communication such as the Internet, computers and mobile technologies. When mobile technology is used to support learning, it is called mobile learning technology. The use of mobile technology allows for cloud teaching where access to information is possible no matter one's location (Alsaadat, 2017; Ally & Prieto-Blázquez, 2014). Several scholars posit the potential for ICT to make significant contributions in the field of inclusive education, and I suffice with the following quote in this respect: "ICT embraces inclusive education by providing added opportunities, alternative methods of instruction and flexible assessment" (Serero, 2010, p. 15). Therefore, ICT has the potential to meet the needs of ADHD learners (Florian & Hegarty, 2007). Teachers use iPads for differentiation, but there is also the need to develop the usage of iPads to be more engaging and most importantly in helping learners to learn (Frazier, 2014).

During the latter part of the 20<sup>th</sup> century and throughout the 21<sup>st</sup> century, technology has become an integral part of teaching. The advancements in mobile learning technology have dramatically changed the teaching and learning landscape. This technology is dramatically changing the educational process, and the introduction of mobile pedagogy is dramatically impacting learners' lives in the classroom. MLT has expanded to create new learning



opportunities and new ways of creating access to educational resources beyond that of traditional teaching and learning methods (Dias & Victor, 2017; Serero, 2010).

“Mobile devices have introduced a new generation of educational tools” (Dias & Victor, 2017, p. 340). MLT thus has great potential to engage learners in ways that will help to realise their talents. It enables learners to develop new skills and gives them access to information (Dias & Victor, 2017; Florian & Hegarty, 2007; Serero, 2010). “We live in a historical period when knowledge has turned out to be the most important basic resource. Rapid progress in knowledge and easy access to information are becoming a driving force of economic and social development” (UNESCO, 2005, p. 6). A combination of the barriers that ADHD learners struggle with as stated above, show the critical need for new and innovative ways to approach teaching these learners.

MLT provides learners with multisensory, multimedia information that can enhance and reinforce teaching (Florian & Hegarty, 2007). Linking this to the developmental theories by Vygotsky, Piaget and Gardner we see that learners can learn through play, multiple intelligences and through overlapping domains. Learners are more engaged and involved at their own level and build on the knowledge they already have (Ahmad, 2015; Armstrong, 2009; Venter, 2013; Wearmouth, 2008).

Although research exists globally related to the effectiveness of ICT and MLT as intervention/supportive devices (Regan et al., 2014), how such technologies are used effectively to support learners with barriers to learning and development is limited (Cumming & Rodríguez, 2017; Nelson, 2007; Regan et al., 2014). This is particularly the case in South Africa, with only a handful of studies pointing to effectiveness in specific subjects, for example, mathematics (Mogodi, 2013). Internationally, however, much research has been done which focuses on the use of ICT and MLT with regards to the assistance of learners to gain specific skills in mathematics, spelling, and reading (Bouck & Flanigan, 2009; Blischak & Schlosser, 2003; Kara, 2008; Torgesen et al., 2010 as cited by Regan et al., 2014).

Most of this research indicates a positive impact on the achievement of learners (Ahmad, 2015; Cumming & Rodríguez, 2017; DuPaul, et al., 2006; Florian & Hegarty, 2007; Ludlow, 2001; Mogodi, 2013; UNESCO INSTITUTE, 2006). The most common factors that affected ICT’s results were teacher inexperience and lack of understanding of what the role of the ICT was. (Ludlow, 2001; MacArthur & Malouf, 1991; Mogodi, 2013; Moore et al., 1994; Richardson,

2014). Within the realm of special education, the most current research results on the effectiveness of ICT and MLT which focused on a meta-analysis of the use of MLT in supporting individuals with disabilities indicated some evidence of effectiveness (Cumming & Rodríguez, 2017). Research has also indicated the value and benefit of ICT and MLT on literacy with special needs (Hayes & Whitebread, 2006: 41).

UNESCO forward that encouraging ICT substructure for special needs is essential in order to afford appropriate circumstances for teaching and learning in the special school setting (UNESCO INSTITUTE, 2006), as it offers teachers new opportunities to develop their professional skills, whether in the classroom or the virtual classroom (DoE, 2006). The recognition of the value of MLT and its ability to solve problems and assist in the remedial education fields have also been noted (Ludlow, 2001). However, the crucial questions that remain unanswered include the possible ‘best’ ways to integrate and use MLT and associated apps to support learning particularly in remedial education, how it is used and why it is used, especially with learners with barriers to learning (Ahmad, 2015; Florian & Hegarty, 2007; Serero, 2010).

Mobile learning utilises smart devices such as cellphones and tablets (Sharma, 2015; Xie et al., 2018). These devices have educational applications (Apps) on them and are being used to contribute to education through the creation of self-directed, learner-centred, and creative learning. This means that Apps are becoming an important method that is expanding and becoming more popular to help learners’ access educational content (Lee & Kim, 2015; Shuler, 2012). Apps present new ways to learn that were previously not possible (Lee & Kim, 2015).

According to statistics, there are currently 2.2 million Apps available on the Apple store (Statista, 2017). The 3<sup>rd</sup> most popular category in the Apple App Store for download is Education, with 8.49 % of the 180 billion Apps downloaded being part of the educational category (Statista, 2018). There are 40,000 + educational Apps to choose from (Lee & Kim, 2015). Educators have the opportunity now more than ever to harness this medium as a powerful educational tool (Shuler, 2012).

The importance of selecting an appropriate App is key to the success of its use as a supportive tool (Shuler, 2012). Lee and Kim (2015) stipulate that the selection of a good App is vital. The process for the selection of these Apps should follow the following steps:

1. Teaching & Learning, which focuses on the App is exciting as well as creating a good level of motivation and self-directedness; it accesses the curriculum and is authentic and in turn creates cognitive development that is developmentally appropriate therefore focusing on reasoning skills, thinking skills, and creativity. This means that learners must enjoy the App and be able to interact and receive incentives for continuing to play. It must create an environment where cooperation and competition are present. A good App should also be able to be personalised for each learner. Skills should be targeted, and one should not want too many skills being used/taught at once. Authenticity means that connections are created between old and new knowledge.
2. Screen Design relates to the ease of use and the look and feel of the App. This also includes aspects like the accessibility of the App, the requirements, etc. relating to cost, what platforms one can access it on, etc.
3. Economy & Ethics: The above links closely to the aspect of economy and ethics advertisements, cost, and quality of the App (Lee & Kim, 2015). These aspects are also discussed by Apple Inc (2014).

The success therefore of any ICT learning device and its Apps as a supportive device is measured by its actual usage, the ease, satisfaction and interaction one has with the device and its Apps and their environment. It is essential to ensure that the ICT learning device and Apps are based on the individual needs of each learner (Ahmad, 2015). Despite the challenges that the implementation of ICT, MLT and its Apps face, many researchers believe that it has an immense potential to support learners, specifically in an inclusive learning environment (Ahmad, 2015; Florian & Hegarty, 2007; Hasselbring & Glaser, 2000; Ludlow, 2001; UNICEF, 2015).

## **2.9 CONCLUSION**

The use of ICT, especially MLT, using devices such as iPads and mobile phones with their associated Apps have nevertheless been recognised as important support mechanisms for learners with barriers to learning and development difficulties resulting in “schools (are) already widely using the devices, leaving teachers with the task of choosing how to incorporate them into their pedagogy” (Cumming & Rodríguez, 2017, p. 2).

Teachers are therefore vital to the successful use of MLT and its associated Apps in the classroom as a supporting tool (Yusri & Goodwin, 2013). Teacher reluctance in using MLT and associated Apps can also be allayed as teachers can never be replaced by technology, but their teaching can, however, be complemented and enriched by it (Hasselbring & Glaser, 2000; Ludlow, 2001; MacArthur & Malouf, 1991; Moore et al., 1994; Richardson, 2014).

Developing a more precise understanding that mobile learning technology does not replace teaching but rather supports and complements teaching, is therefore essential. Collaboration between the teacher and the MLT devices seem to be critical to its success with many studies pointing to the importance of the teachers' attitude and their knowledge of how a device can assist learners in learning and development (Ludlow, 2001; MacArthur & Malouf, 1991; Mogodi, 2013; Moore et al., 1994; Richardson, 2014). A further realisation relates to a recognition of the value of mobile learning technology and its ability to solve problems and assist in the special education area (Ludlow, 2001). The challenge appears to be in finding the best ways to integrate and use MLT to solve problems and assist in the special education area, with specific attention to how it is going to be used and why one is using it (Ahmad, 2015; Florian & Hegarty, 2007; Serero, 2010).

## **CHAPTER THREE: METHODOLOGY**

### **3.1 INTRODUCTION**

This chapter outlines the research methods which were followed in this study. It gives information related to the participants and their selection. Including who the participants were. It disusses the selection of the sight and how participants were sampled. The researcher describes the research methodology, design and approach related to the purpose and aim of this study . This section gives a description of the instrument that were used for data collection and the procedures that were followed. The procedure used to analyse the data the data is also outlined. Finally, the ethical procedures followed in the study are also discussed.

The purpose of this study is to explore and describe Foundation Phase teachers in remedial schools' perceptions of the use of mobile learning technology to support learners presenting with Attention Deficit Hyperactivity Disorder (ADHD).

This particular study aims to explore and describe how Foundation Phase teachers in one selected remedial school perceive the use of mobile learning technology and its associated applications to support learners presenting with ADHD.

### **3.2 RESEARCH DESIGN AND METHODOLOGY**

Research design is the overall map and plan one decides on when conducting research and provides guidelines for the process that was followed (Creswell, 2007; Creswell, 2014; de Vos et al., 2011; McMillan & Schumacher, 2014; Saunders et al., 2015; Scott & Morrison, 2005). The design includes the underlying philosophical assumptions, the section of participants, the data collection and analysis procedures and the verification of the study (Maree, 2011).

#### **3.2.1 Methodology , Paradigm and Approach**

Research, in general, has underlying philosophical assumptions or paradigms which direct the research regarding what would constitute 'valid' research (Creswell, 2007; Creswell, 2014; de Vos, Strydom, Fouché, & Delpont, 2011; Scott & Morrison, 2005). These research paradigms give direction to the researcher in the selection of which research methods are appropriate for the acquisition of knowledge in a given study. Therefore, knowing what these assumptions are

is vital to direct research (Creswell, 2007; Creswell, 2014; de Vos, Strydom, Fouché, & Delpont, 2011; Scott & Morrison, 2005).

As this study is concerned with teachers' perceptions of the use of mobile technology to support learners presenting with ADHD in a remedial classroom, an interpretive paradigm was deemed appropriate. The interpretive paradigm is seen as guiding research to get 'insight' and detailed information through an awareness and understanding of participants background, beliefs, perceptions and experiences (Creswell, 2007; Creswell, 2014). This is critical to the study as it looks at the perceptions of the teachers using MLT as a supportive tool for learners experiencing ADHD. It is to gain an insight and understanding of using MLT. This study aims to attempt to understand the teachers' experiences within the specific context of a remedial school and is therefore inductive and qualitative. I therefore selected this paradigm and approach because I assumed that there were multiple realities and that reality is socially constructed and therefore, I could make use of social constructivism to understand the unit of analysis (Creswell, 2007; Creswell, 2014; de Vos et al., 2011; Saunders et al., 2015; Scott & Morrison, 2005).

In summary, the current study departs from an interpretivist paradigm using a qualitative research approach to understand and describe Foundation Phase teachers' perceptions of using mobile learning technology to assist learners presenting with ADHD in remedial classrooms.

### **3.2.2 Research design**

The case study design was considered the most appropriate to utilise in this study as perceptions of Foundation Phase teachers in one selected remedial school was the focus. Given the aim above of the study, a qualitative case study design was used (Creswell, 2007; Creswell, 2014; de Vos et al., 2011).

Case study research designs are described as in-depth analyses of a single element often used in exploratory research. It explores a closed system in-depth, focusing on elements like an activity, event, a process or an individual within a real-life context using multiple sources of information bound by a particular time, place, participant or characteristic (Creswell, 2007; Creswell, 2014; de Vos et al., 2011; McMillan & Schumacher, 2014; Saunders et al., 2015; Scott & Morrison, 2005; Yin, 2011). Understanding that the use of a case study allows one to gain a rich understanding of the context of the research and the process being encountered or experienced makes it an appropriate design to finding answers to questions like why, what, and

how (Creswell, 2007; Creswell, 2014; de Vos et al., 2011; McMillan & Schumacher, 2014; Saunders et al., 2015;; Scott & Morrison, 2005; Yin, 2011).

### **3.2.3 Selection and description of the research site**

Purposive sampling is used in qualitative research to help understand a phenomenon under study (Creswell, 2014) and was, therefore, the most suitable sampling method for the current study which attempted to explore and understand teachers' perceptions of how learners presenting with ADHD were supported through the use of MLT in a remedial school.

Remedial schools in the Gauteng province were firstly purposively selected as this province has the most remedial schools and the most learners who experience ADHD (DoBE, 2015). From these remedial schools in Gauteng, one school was selected purposively to be the focus of the study.

This school was firstly selected purposively as the school had embarked on a programme to roll out the use of MLT devices and associated Apps in classrooms in 2017. The school is an Independent institution which ensures that learners and teachers have access to such MLT and applications. The school has allocated 30 scheduled minutes per week on their timetable for Foundation Phase teachers where MLT devices, in this case, iPads with educational applications, are used to support learners.

The school was also considered an appropriate site as it enrolls learners who have learning barriers which require extra support due to its nature as a remedial school. The school also has a functioning multidisciplinary team which supports the teachers and learners and who can assist teachers in the use of MLT and applications which focus on the acquisition of foundational skills in reading, spelling and numeracy.

As stated, the school was purposefully selected as an environment that is data-rich and potentially able to supply knowledge and understanding of how Foundation Phase teachers use MLT and applications to support ADHD learners.

### **3.2.4 Selection of participants**

The Foundation Phase teachers were purposively selected to be the focus of the research as neurodevelopmental disorders often become apparent during the Foundation Phase when



learners start to learn foundational skills in reading, writing and numeracy (APA, 2013; Barkley, 2006; Barkley et al., 2006; Decaires-Wagner & Picton, 2009; Landsberg, 2016).

The Foundation Phase teachers in the selected school were purposively selected to participate in the study. The Foundation Phase in this school consists of nine classes, namely one Grade R class, two Grade 1 class, three Grade 2 classes and three Grade 3 classes. One teacher from each of the Foundation Phase grades was randomly selected to be part of the study.

Therefore, the Grade R class teacher was automatically selected, while one teacher from each of the remaining Foundation Phase grades was randomly selected by placing their names in a bowl and randomly picking one teacher from each of these grades. Teachers were all approached to voluntarily participate in the study and in the event that a selected teacher did not consent to participate, another participant would be randomly selected from the remaining teachers in that grade.

### **3.3 PROCEDURES FOR DATA COLLECTION**

The data collection technique employed in this study was predominantly interviewing. Although case study designs expect multiple sources of information to create rich data to inform the research question, the researcher decided only to use individual and one focus group interview in an attempt to gain an understanding of Foundation Phase teachers' perceptions of using MLT to support learners presenting with ADHD in remedial schools (Creswell, 2007; Creswell, 2014; de Vos et al., 2011; McMillan & Schumacher, 2014; Saunders et al., 2015; Scott & Morrison, 2005).

#### **3.3.1 Interview**

Interviews of differing formats exist such as informal interviews, guided interviews, and open-ended question interviews (Creswell, 2007; Creswell, 2014; de Vos et al., 2011; McMillan & Schumacher, 2014; Saunders et al., 2015; Scott & Morrison, 2005). Interviews are generally two-way conversations between an interviewer and interviewee in an attempt to learn about the beliefs and opinions or behaviours of the unit of analysis. Any interview aims to delve deeply into the world of the interviewee to collect in-depth descriptive data to understand how the interviewee constructs social reality (Maree, 2011). Different types of interviews exist, namely unstructured, semi-structured and structured interviews. The interviews used in this case study were semi-structured interviews. Semi-structured interviews are guided interviews, generally

used to support data emerging from other sources, are generally shorter than open-ended interviews and have a set of predetermined questions focused on answering the research question (Maree, 2011; Creswell, 2007; Creswell, 2014; de Vos et al., 2011; McMillan & Schumacher, 2014; Saunders et al., 2015; Scott & Morrison, 2005). Semi-structured interviews, therefore, follow a basic interview schedule (Maree, 2011; Creswell, 2007; Creswell, 2014; de Vos et al., 2011; McMillan & Schumacher, 2014; Saunders et al., 2015; Scott & Morrison, 2005).

An interview schedule focusing broadly on the following was used in the **individual interviews**:

- What are the mobile learning technologies they use in the foundation phase classroom;
- How they use such mobile learning technologies;
- When do they decide to use such mobile learning technologies;
- How these mobile learning technologies succeed in supporting learners with special education needs.

Individual semi-structured interviews were conducted with each grade teacher selected. These interviews were scheduled at a time and place convenient for teachers after school. Interviews were conducted by the researcher and audio-recorded with informed consent.

One semi-structured **focus group interview** was conducted with the remaining Foundation Phase teachers not initially selected to be participants in the individual interviews for the study. This focus group interview aimed to enhance the data from the individual interviews and to provide multiple perspectives on the issues and allow for a broader range of information. It was hoped that the additional focus group information would afford some measure of triangulation. This interview was scheduled at a time and place convenient for teachers after school, conducted by the researcher and audio-recorded with the consent of the participants. A single, guiding question for this **focus group interview** was:

- What are your views of how you as Foundation Phase teachers support learners presenting with ADHD with mobile learning technologies and associated apps in this remedial school?

### 3.4 DATA ANALYSIS PROCEDURES

The primary strategy employed for data analysis is qualitative, and as explained by Nieuwenhuis (2016), should be viewed as a cyclical, iterative and ongoing process of data collection and data analysis. The cyclical process is guided by the criterion of the saturation of data which is identified by reflecting on data, identifying gaps in data and planning further data gathering.

This study made use of thematic content analysis in which patterns or themes in the data were identified (Maguire & Delahunt, 2017). The researcher chose this method to analyse the data as it allows for flexibility in data collection and analysis (Maguire & Delahunt, 2017). A six-step framework as developed by Braun and Clarke (2006), is generally followed, namely:

1. *Familiarisation with data* – engaging in the transcribing of interviews.
2. *Generation of initial codes* – identifying preliminary codes of meaningful data.
3. *Finding themes* – analysing the relationships between preliminary codes.
4. *Reviewing themes* – creating thematic maps to identify relevant and irrelevant themes.
5. *Defining themes* – refining themes and subthemes of data.
6. *Writing-up themes* – reporting the themes with empirical evidence and compelling extracts to support the analysis.

Braun and Clarke (2006), identify two levels of themes, namely the semantic level and the latent level. The focus of the analysis in this study was placed on the semantic level, thus not looking for anything beyond what the participants said in an attempt to gain an understanding of teachers' perceptions. The protocol followed in the analysis for this study was a five-phase cycle including compiling, disassembling, reassembling, interpreting and concluding as proposed by Yin (Yin, 2011).

Data was firstly compiled by transcribing and recording it in a central plan (Creswell, 2007; Saunders et al., 2015). During this process, tentative categories and patterns that the data could be organised into were identified using open coding (Yin, 2011). Hereafter, all the data was coded to identify underlying messages using a personal computer and were provided digitally in Microsoft Word and Excel (Creswell, 2007; Saunders et al., 2015; Yin, 2011). Data was then disassembled into smaller pieces of information through 'labelling' data (Creswell, 2007; Saunders et al., 2015; Yin, 2011). Reassembling data through categorising labels followed where categories were graphically represented in tables (Creswell, 2007; Saunders et al., 2015; Yin, 2011). Data was then interpreted by using reassembled data to create a narrative of the

analysis. Major themes were highlighted, similarities and differences shown, and the researcher's understanding of the analysis noted (Creswell, 2007; Saunders et al., 2015; Yin, 2011). Finally, a conclusion was drawn after critically analysing the information at hand (Creswell, 2007; Saunders et al., 2015; Yin, 2011).

All analyses of data were carefully catalogued, recorded and preserved to ensure clarity of the process followed in the analysis of data.

### **3.5 TRUSTWORTHINESS**

The trustworthiness of this study was ensured by applying the following criteria: credibility, dependability, authenticity/transferability and confirming. (Creswell, 2007; Shenton, 2004).

#### **3.5.1 Credibility**

Credibility aims to answer the congruence of the findings with reality (Shenton, 2004). The researcher ensured that the data collection process and the recording of the data were completed according to the ethical guidelines and processes outlined. The researcher took careful cognisance of the context in which the data was collected to minimise possible misunderstandings during data collection (Shenton, 2004). The researcher was familiar with the school environment where the data was collected but regularly reflected with her supervisor on the processes of data collection and analyses to curb against possible researcher bias. The researcher attempted to triangulate findings by using different interviewing types and participants to gain a nuanced understanding of the problem. Credibility was also attained through informed consent, the freedom to withdraw at any time without penalty, thus respecting voluntary participation (Shenton, 2004).

#### **3.5.2 Dependability**

Dependability indicates the stability and consistency in the process (Creswell, 2007; Creswell, 2014; de Vos et al., 2011; McMillan & Schumacher, 2014; Saunders et al., 2015; Scott & Morrison, 2005; Yin, 2011). The researcher clearly outlined the research design and methodology as well as data collection and analysis procedures in this study. The researcher ensured that data was analysed according to a protocol, and ensured detailed accounts of the recording, analyses and findings emanating from the data. All data sources and analyses were provided to ensure the dependability of the study.

### **3.5.3 Authenticity/transferability**

Transferability refers to the degree the findings of the research are relevant and applicable to similar studies, also outside the boundaries of the current study. The researcher attempted to explain the protocols for data collection and data analysis procedures as clearly as possible for possible use in similar contexts (Burchett et al., 2012; Creswell, 2007; Creswell, 2014; de Vos et al., 2011; McMillan & Schumacher, 2014; Yin, 2011). The hope is that the perception of teachers in using MLT and specific applications as became apparent in this study may be transferable to similar and even related teaching contexts.

### **3.5.4 Confirmability**

Confirmability refers to the process of reviewing and reanalysing data, to ensure a high degree of objectivity (Creswell, 2007; Creswell, 2014; de Vos et al., 2011; McMillan & Schumacher, 2014; Saunders et al., 2015; Scott & Morrison, 2005; Yin, 2011). All data collection and analyses procedures were carefully catalogued and stored for scrutiny. Member checks were also used to ensure that the transcriptions of interviews were reflective of the actual conversation between the researcher and the participants. The researcher disassembled and reassembled the data during the analysis process on more than one occasion to ensure that the data was analysed thoroughly and was as unbiased and accurate as possible. More than one critical reader, including the researcher's supervisor, was also requested to continuously read the work in an attempt to assist in ensuring confirmability.

## **3.6 ETHICAL CONSIDERATIONS**

All research must abide by guidelines of ethical standards that need to be practised in order for professional and academic communities to keep to their responsibilities as researchers. Researchers should attempt to address the following ethical issues in the planning and completion of a study, namely informed consent; ensuring confidentiality, privacy and anonymity of the participants; and allowing for voluntary participation and withdrawal without penalty (Creswell, 2007; Creswell, 2014; de Vos et al., 2011; McMillan & Schumacher, 2014; Saunders et al., 2015; Scott & Morrison, 2005; Yin, 2011). The school had also permitted for the study to be undertaken, which would allow the researcher convenient and regular access. This study also received ethical clearance from the University of Johannesburg.

### **3.6.1 Privacy**

Participants were assured of their privacy. All interviews were given labels so as not to identify the participant or the class used. The fact that there was only one Grade R classroom was the exception, although the researcher ensured that no identifiers for these participants were located on any of the data sources or analyses.

### **3.6.2 Voluntary**

All participants were invited to participate voluntarily. They were provided with detailed information regarding the study beforehand to ensure that the process was transparent and clearly outlined to them. They were given the option of withdrawing their participation at any time without fear of any consequence or penalty.

### **3.6.3 Consent**

Consent was always informed. Consent to complete the study at this independent institution was negotiated with the school board through the principal of the school. All participating teachers were provided with a detailed description of what the research aimed at, what their roles and responsibilities in gathering data were, as well as what their rights were concerning the research. This was achieved by way of a formal letter of consent which described the study as well as the responsibilities and rights they had as participants.

In the case of the selected classes involved, all learners were provided with a formal letter informing parents of the focus of the study as well as the assurance that no learners would be part of the data collected or be involved directly in the study. In the case of indirect involvement where teachers may have mentioned the learners, the parents were assured of absolute confidentiality and anonymity of their children.

### **3.6.4 Confidentiality**

All names were excluded from all documents, analyses and reports on the analyses. This included the name of the school, the teachers, learners and identifiers of the classes. All names and identifiers were replaced with codes, mainly letters and labels. The information of all involved was protected from the start of the research to its conclusion.

### **3.6.5 No Harm**

The participants were protected from any embarrassment, stress or discomfort. Their well-being was a priority. Any incidents occurring which caused pain or harm to any participants were immediately referred to the Educational Psychologist at the school for counselling.

### **3.7 CONCLUSION**

This chapter discussed the paradigm and approach to the study. This study is an interpretive paradigm study and uses a single case study design. The school and the participants were purposively selected. Semi-structured interviews and a semi-structured focus group interview were used to collect the data. Braun and Clark's (2006), method of thematic content analysis was followed. The trustworthiness and ethical considerations were discussed in detail. In the next chapter (Chapter Four), the analyses of the data and resulting findings will be presented using verbatim responses from all datasets.





## **CHAPTER FOUR: DATA ANALYSIS**

### **4.1 INTRODUCTION**

This chapter outlines the data analysis process and the culmination of this process in the identification of emerging themes from the data by way of a thematic analysis of the qualitative data. Verbatim responses are included in the discussion of the themes to ensure a degree of credibility to the process of analysis and to corroborate the findings made.

### **4.2 DATA ANALYSIS PROTOCOL**

#### **4.2.1 Context of analysis**

The school and the participants were purposively selected. Semi-structured interviews and a semi-structured focus group interview were used to collect the data. An interview schedule was used which asked the questions: What are the mobile learning technologies they use in the foundation phase classroom; How they use such mobile learning technologies; When do they decide to use such mobile learning technologies; How these mobile learning technologies succeed in supporting learners with special education needs. The teachers selected for these interviews included one teacher from each grade in the Foundation Phase. The remaining teachers participated in a focus group which focused on: What are your views of how you as Foundation Phase teachers support learners presenting with ADHD with mobile learning technologies and associated apps in this remedial school? The following data sources were used in the analyses of the data. Table 4.1 has been added to allow for ease of reference of the original data sources and the selected verbatim responses.

The research was conducted at an independent remedial school representing learners from diverse racial and cultural groups. The school caters specifically for learners confronted with barriers to learning and development, including learners presenting with attention deficit hyperactivity disorder (ADHD). The school implemented the use of iPads as MLT in 2017 in the form of 30 min scheduled lessons once a week for each class in the Foundation Phase. The Foundation Phase in the purposively selected school is made up of one Grade R teacher, two Grade 1 teacher, three Grade 2 teachers and three Grade 3 teachers.

This study focused specifically on the perceptions of the Foundation Phase teachers when using MLT to support ADHD learners. I selected participants by means of purposive sampling from

the Foundation Phase of the school. One teacher was randomly selected from each grade to participate in semi-structured individual interviews. The remaining teachers were asked to participate in a focus group discussion. The Grade R teacher was automatically selected for the individual interviews because the school only has one Grade R class. Table 4.1 reflects a brief description of the participants, as well as the labels with which their perceptions during the interviews will be represented.

**Table 4.1: Legend of labels with reference to data sources**

<i>Type of data collection</i>	<i>LABEL</i>	<i>Gender of participant</i>	<i>Description of participant</i>	<i>LABEL</i>	<i>Grade taught</i>	<i>LABEL - Line numbers of verbatim responses</i>
<b>Individual Interview</b>	IDI	Female	<i>Teacher 1</i>	<i>T1</i>	Grade 3	L
		Female	<i>Teacher 2</i>	<i>T2</i>	Grade 1	
		Female	<i>Teacher 3</i>	<i>T3</i>	Grade R	
		Female	<i>Teacher 4</i>	<i>T4</i>	Grade 2	
<b>Focus Group Interview</b>	FGI	Female	<i>Teacher 5</i>	<i>T5</i>	Grade 2	L
		Female	<i>Teacher 6</i>	<i>T6</i>	Grade 3	
		Female	<i>Teacher 7</i>	<i>T7</i>	Grade 3	
		Female	<i>Teacher 8</i>	<i>T8</i>	Grade 1	
		Female	<i>Teacher 9</i>	<i>T9</i>	Grade 1	

#### **4.2.2 Analysis protocol**

Thematic content analysis is stated by Maguire and Delahunt (2017, p. 2), as “the process of identifying patterns or themes within qualitative data”. This is seen as a cyclical process as stated by Nieuwenhuis (2016), meaning that data analysis begins after the first data has been collected. In the case of this study, initial analysis began after the first individual interview was completed, transcribed and member checked. This process was adhered to whilst all data was collected.

A six-step framework as developed by Braun and Clarke (2006), is generally suggested when one is undertaking analysis of qualitative data. This process is presented in Figure 4.2., where

after I provide a brief description of the process followed in the analysis of the current study. The full analysis using these steps can be viewed in Appendix B.

**Table 4.2: Data analysis (Adapted from Braun & Clarke, 2006).**

Step	Explanation
<b>Step 1: Become familiar with the data</b>	a) engaging in the transcribing of interviews.
<b>Step 2: Generate initial codes</b>	b) identifying preliminary codes of meaningful data.
<b>Step 3: Search for themes</b>	c) analysing the relationships between preliminary codes.
<b>Step 4: Review themes</b>	d) creating thematic maps to identify relevant and irrelevant themes.
<b>Step 5: Define themes</b>	e) refining themes and subthemes of data.
<b>Step 6: Write-up</b>	f) reporting the themes with empirical evidence and compelling extracts to support the analysis.

### 4.2.3 Become familiar with the data

Data was firstly compiled by transcribing and recording it in a central plan (Creswell, 2007; Saunders et al., 2015). The first step in any qualitative analysis is to become familiar with the data and this entails reading and re-reading the transcripts (Maguire & Delahunt, 2017). Figure 4.1 is a transcript extract after this initial step in the analysis, with ‘interesting observations in the data’ shown in different colours.

line no.	Speaker	Conversation
1	DN	Thank you for taking part in my study.
2	T1	It's an absolute pleasure
3	DN	I've just got some questions. You have an iPad lesson, where you use apps with children.
4	T1	Yes.
5	DN	I'd just like to find out from you, how do you find using the iPads in that lesson?
6	T1	Since we only have the iPads once a week, it's for maybe a 30 to 40-minute lesson. It's
7	T1	quite short to plan a lesson. We usually try to use that lesson to consolidate concepts we've
8	T1	learnt in the week, so we can do it in a fun way. We use apps like Kahoot! and then we
9	T1	consolidate concepts there. Or we use the Mathletics app which the school has provided for
10	T1	the learners, and the teacher can allocate tasks for the learner. And then from there, it gives
11	T1	us a graph to see if they've understood the maths concept or not. We also just let them
12	T1	explore on the iPad. We do some creative writing using the iPad with Puppet Pals where
13	T1	they can work in groups. But like I said, since it's just once a week and we don't have our

**Figure 4.1: Exemplar: colour coding of the initial observations in familiarisation with the data**

#### 4.2.4 Generate initial codes

The second step was to tentatively categories and find the patterns that the data could be organised into using open coding (Yin, 2011). Hereafter all data was coded to identify underlying messages using a personal computer and were provided digitally in Microsoft Word and Excel (Creswell, 2007; Saunders et al., 2015; Yin, 2011). The data was put into an Excel spreadsheet and the first themes were extracted out of each interview. An example follows in Figure 4.2.

line no.	Speaker	Conversation	Comment 1 and analysis 1
1	DN	Thank you for taking part in my study.	
2	T1	It's an absolute pleasure	
3	DN	I've just got some questions. You have an iPad lesson, where you use apps with children.	
4	T1	Yes.	not enough support for literacy , can do more (line 20, 22,23)
5	DN	I'd just like to find out from you, how do you find using the iPads in that lesson?	
6	T1	Since we only have the iPads once a week, it's for maybe a 30 to 40-minute lesson. It's	
7	T1	quite short to plan a lesson. We usually try to use that lesson to consolidate concepts we've	Used to consolidate concepts (Line 7)
8	T1	learnt in the week, so we can do it in a fun way. We use apps like Kahoot! and then we	Maths concepts (Line 11 and 16 and 18)
9	T1	consolidate concepts there. Or we use the Mathletics app which the school has provided for	Concepts consolidation, time, place , value , money ( line 17)
10	T1	the learners, and the teacher can allocate tasks for the learner. And then from there, it gives	Creative Writing (line 12)
11	T1	us a graph to see if they've understood the maths concept or not. We also just let them	Literacy (Line 18)
12	T1	explore on the iPad. We do some creative writing using the iPad with Puppet Pals where	
13	T1	they can work in groups. But like I said, since it's just once a week and we don't have our	

**Figure 4.2: Exemplar: open coding of initial colour coded excel data**

## 4.2.5 Search for themes

Data was then disassembled into smaller pieces of information through ‘labelling’ data (Creswell, 2007; Saunders et al., 2015; Yin, 2011). Reassembling data through categorising labels followed where categories were graphically represented in tables (Creswell, 2007; Saunders et al., 2015; Yin, 2011) as shown in the exemplary Figure 4.3.

line no.	Speaker	Conversation	Comment 1 and analysis 1	Analysis 2 basic themes
1	DN	Thank you for taking part in my study.		
2	T1	It's an absolute pleasure	lessons are 30-40 min once a week ( Line 6)	Time period used
3	DN	I've just got some questions. You have an iPad lesson, where you use apps with children.		lessons are 30-40 min once a week ( Line 6)
4	T1	Yes.	not enough support for literacy , can do more (line 20, 22,23)	Used for
5	DN	I'd just like to find out from you, how do you find using the iPads in that lesson?		Used to consolidate concepts (Line 7)
6	T1	Since we only have the iPads once a week, it's for maybe a 30 to 40-minute lesson. It's		Maths concepts (Line 11 and 16 and 18)
7	T1	quite short to plan a lesson. We usually try to use that lesson to consolidate concepts we've	Used to consolidate concepts (Line 7)	Concepts consolidation, time, place , value , money ( line 17)
8	T1	learnt in the week, so we can do it in a fun way. We use apps like Kahoot! and then we	Maths concepts (Line 11 and 16 and 18)	Creative Writing (line 12)
9	T1	consolidate concepts there. Or we use the Mathematics app which the school has provided for	Concepts consolidation, time, place , value , money ( line 17)	Literacy (Line 18)
10	T1	the learners, and the teacher can allocate tasks for the learner. And then from there, it gives	Creative Writing (line 12)	
11	T1	us a graph to see if they've understood the maths concept or not. We also just let them	Literacy (Line 18)	Apps used and for what
12	T1	explore on the iPad. We do some creative writing using the iPad with Puppet Pals where		Apps used Kahoots, (line 18 and 8)- gives both maths and literacy
13	T1	they can work in groups. But like I said, since it's just once a week and we don't have our		Puppet pals- creative writing
14	T1	own iPad, it's difficult to plan a lesson on there.	Apps used Kahoots, (line 18 and 8)- gives both maths and literacy	Mathletics - maths (Line 9)
15	DN	In terms of the apps that you were speaking about now, what learning areas are these apps	Puppet pals- creative writing	
16	T1	focused on? You mentioned Mathletics, so I'm assuming that's maths.	Mathletics - maths (Line 9)	Identified learners
17	T1	Yes, so that's maths and then they've got all the concepts that we've done in the year.		there are adhd learners (line33 )
18	T1	They have time, place, value, money... all of the concepts we've done. And then we mainly		they enjoy it more than just normal , conventional , sitting -behind-the desk looking at the teacher typer of thinking. (line 36 and 37)
18	T1	use it for numeracy and literacy. Kahoot! will have literacy as well.		

Figure 4.3: Exemplar: labelling and categorising into initial themes

## 4.2.6 Review themes and define themes

Interview 1	Interview 2	Interview 4	Interview 5	Summary of Themes
Analysis 2 basic themes	Analysis 2 basic themes	Analysis 2 basic themes	Analysis 2 basic themes	
Time period used	Time period used	Time period used	Time period used	Time Period is too short
lessons are 30-40 min once a week ( Line	bit of a waste of time line 5	too little time 30 mins line 48 and 50	half an hour is not enough line 11 70	Interview 1: line 6
	about 20 minutes and then for 10 minutes, line 10			Interview 2: line 5, 10 and 14
	don't think there is enough to be quite honest. Line 14			Interview 4: line 48 and 50
				Interview 5: line 11 and 70
Used for	Used for	Used for	Used for	Used for
Used to consolidate concepts (Line 7)	literacy line 82	Academic enrichment line 14	maths and literacy line 33	Mathematics
Maths concepts (Line 11 and 16 and 18)	doubling , halving, symmetry line 7,8, 32	story retelling line 17	bonds line 37	Interview 1: line 11 , 16 , 17,18
Concepts consolidation, time, place , value , money ( line 17)	blending sounds line 9 and 16	reinforcement line 33		Interview 2: Line 7,8,32,22 and 23
Creative Writing (line 12)	sounds line 15			Interview 5: 33
Literacy (Line 18)	bonds line 22 and 23			Literacy
				Interview 1: Line 12 and 18
				Interview 2: Line 82 , 9 , 16 , 15
				Interview 4: Line 17
				Enhancement/ reinforcement
				Interview 1 : line 7
				Interview 4: line 14
Apps used and for what	Apps used and for what	Apps used and for what	Apps used and for what	Apps
Apps used Kahoots, (line 18 and 8)- gives both maths and literacy	puppet pals line 82 and 83	Kahoot line 19	Eggy maths line 36	Mathematics
Puppet pals- creative writing	Kahoot line 5 and 6 , 31 , 36, 40	Mathletics line 15	Lego App Line 5	Kahoots
Mathletics - maths (Line 9)	mathletics line 11	Puppet Pals lines 16 and 17 ,34	Kahoot line 7, 8, 9,11	Interview 1: line 18 and 8
		Lego line 25	Purple mash line 23	Interview 2: Line 5 , 6 , 36 ,40
			Eggy perceptual line 45	Mathletics
				Interview 1: line 9
				Interview 2: line 11
				Interview 4: Line 15
				Eggy Maths
				Interview 5: line 36

Figure 4.4: Exemplar: disassemble and reassemble data into themes and subthemes

Data was then interpreted by using reassembled data to create a narrative of the analysis (see Figure 4.3 above). Major themes were highlighted, similarities and differences shown, and the researcher’s understanding of the analysis noted (Creswell, 2007; Saunders et al., 2015; Yin, 2011). At this point, I attempted to cluster possible subthemes into categories to create emerging themes.

As I had collected data through semi-structured individual interviews with selected Foundation Phase teachers as well as focus group interview data with the remaining Foundation Phase teachers in the selected school, I considered the identified themes and subthemes from both data-sets to deepen my understanding of the perceptions of the Foundation Phase teachers at this selected school. These identified themes are presented in Figure 4.4.

Summary of Themes	
<b>Time Period is too short</b>	<b>Focus Group support</b>
interview 1: line 6	FG : line 65 195,195 142, 143,184, 185, 144,150,148, 151
interview 2: line 5, 10 and 14	<b>need time to finish lessons</b>
Interview 4: line 48 and 50	FG: Line 185-186, 188-189
Interview 5: line 11 and 70	
<b>Used for</b>	<b>Mathematics</b>
Interview 1: line 11 , 16 , 17,18	FG: line 77,76
Interview 2: Line 7,8,32,22 and 23	
Interview 5: 33	
	<b>Literacy</b>
Interview 1: Line 12 and 18	FG : line 59,75
Interview 2: Line 82 , 9 , 16 ,15	
Interview 4: Line 17	
	<b>Enhancement/ reinforcement</b>
Interview 1 : line 7	FG: Line 202
Interview 4: line 14	
<b>Apps</b>	<b>Mathematics</b>
<b>Kahoots</b>	
Interview 1: line 18 and 8	
Interview 2: Line 5 , 6 , 36 ,40	
<b>Mathletics</b>	

*Figure 4.5: Analysis of data interviews and focus group comparison*

#### **4.2.7 Write-up**

Finally, findings were made after critically analysing the information at hand (Creswell, 2007; Saunders et al., 2015; Yin, 2011). All analysis of data were carefully catalogued, recorded and preserved to ensure clarity of the process followed in the analysis of data (See Appendix B).

### **4.3 EMERGING THEMES**

Through the analysis of the data, it became clear that the data showed important aspects relating to the perspective of teachers in an independent remedial school and how mobile learning technology is being used to support learners with ADHD. In the literature, under Section 1.3, Mogodi (2013), speaks about the importance of teachers' attitudes towards the use of MLT and in Section 2.8 it is noted that the most common factors that affect MLT's results were teacher inexperience and lack of understanding of what the role of the MLTs are (Ludlow, 2001; MacArthur & Malouf, 1991; Mogodi, 2013; Moore et al., 1994; Richardson, 2014). This thus shows the importance of how teachers' perceptions and experience impacts on the overall usage of mobile technology.

Judging from the analysis of the data collected for this study, it was evident that teachers could see the benefit of the use of mobile learning technology in supporting learners with ADHD but were also faced with numerous challenges in using MLT to support these learners. It also became clear that much of what teachers were sharing regarding the use of and challenges they experienced with MLT and its support, appeared to be associated with the interactions between the teachers, the learners, the learning environment and the associated learning required.

In essence, these interactions focused on affording changes in the learner and thus appeared to relate to 'general educational practice' or 'pedagogy' (LeRon Shults, 1999, p. 159). There are differing views to what pedagogy entails; pedagogy is a contested term, but it is seen as activities that cause changes in learning. Looking at a few researchers' definitions below to clarify this term, Watkins and Mortimore (1999), state that pedagogy is a conscious activity by a person designed to enhance the learning of another; Bernstein (2000), states that it is a sustained process that one puts into place which allows for the acquisition of new means or to develop old means to appropriately provide for learning; Alexander (2009), states that pedagogy consists of ideas, beliefs, attitudes, knowledge and understanding about the content, the teaching, the learning process and the students – therefore, he believed that pedagogy can impact on teacher practices and the way teachers ultimately think.



Bernstein (2000), devised two models as pedagogy approaches mainly focusing on teachers' orchestrations of learning, management of the classroom, discourse and collaboration with learners. The first model Bernstein (2000), speaks about is the performance-based model and this tells learners how they learn. The second model is the competency-based model which uses an informal approach and in turn, the teachers respond to the learner's needs (Bernstein, 2000). It is clear from the above that pedagogy can impact on teacher practices and the way teachers ultimately think.

This links to teacher beliefs which are constantly impacted on by the context, social setting, and cultural and political aspects; beyond this, is the understanding that key aspects such as making sure teachers are educated correctly and that this education and development continues throughout their teaching career, is important as it impacts their teaching and pedagogy in a positive manner (Westbrook et al., 2013). This is closely linked to the theoretical framework that this study uses by Bronfenbrenner (1979), which is discussed in Section 1.5 and speaks about the individual who is influenced by all systems and beliefs, thinking and interactions around them. This is also associated with Vygotsky's premise which is that knowledge and cognitive development takes place in social interactions (1978). The table below looks at the theoretical framework of social constructivism, the associated pedagogy and examples of how the pedagogy is used (Westbrook et al., 2013). This is a practical outline of how pedagogy can impact on teaching in the class.

**Table 4.3: Theoretical school of thought and associated pedagogies and examples of the impact**

Broad theoretical school of thought	Associated pedagogy	Examples of pedagogies in developed countries	Examples of pedagogies in developing countries
<b>Social constructivism</b>	Teacher-guided; Learner-/student-centred learning	Reciprocal teaching of reading in the US; Communicative learning; Co-operative learning; Group work element in national strategies, England	Small-group, pair and whole class interactive work, extended the dialogue with individuals, higher order questioning, teacher modelling, showing, problem-solving, inquiry-based, Nali Kali in India, the thematic curriculum in Uganda

The way teachers think and what they believe is therefore impacted on by their pedagogical approach (Westbrook, et al., 2013). Beyond this, there is an alignment between the idea of

insightful thinking and the social constructivist approach discussed above and the idea of pedagogy. The link speaks about including the encouragement of teachers and learners allowing them to become self-directed and allowing them to take control of their learning and their processes (McNamara, O'Hara, & Rousi, 1997). This is also defined as an agency and autonomy.

Agency is seen as the “conscious act of allowing oneself to be free and released from authoritarian control” (Swartz, 1996, p. 400). Agency forms part of looking at teachers, their teaching and their influences in a holistic way of and through this process empowering them (Hodkinson & Sparkes, 1993), It looks at autonomy which is the ability to use theory to guide actions to think critically for oneself and to evaluate the situations and adapt accordingly (Lawson, 2004). “Autonomy affords teachers with choices to adopt, adapt, or reject an instructional reform” (Ertmer, 2014, p. 7).

This means that teachers have the choice of how to implement and what to implement when using a new instructional method or piece of content. This is what Lawson (2004), and Ertmer (2014), state as being part of the process of developing pedagogy that is effective – that teachers need the ability to have autonomy and agency. They also need to be aware of their beliefs which impact on how they go about the process of being autonomous and put into practice their pedagogy (Ertmer, 2014; Lawson, 2004). Beliefs are influential and determine how teachers define tasks, deal with problems and ultimately how they behave (Ertmer, 2014).

From the analyses, it appears that pedagogy, orchestration of learning including autonomy, agency, as well as perceived beliefs dictated how teachers perceived the use of MLT and associated apps in the support of learners with ADHD. What now follows is a discussion of the identified themes and subthemes from the analysis. The data was organised into three central themes, namely “Pedagogy” with related subthemes; “Pedagogical beliefs” and related subthemes; and “Stimulation learning”. A discussion of these themes now follows with the focus on how the use of MLT supported learners presenting with ADHD in a remedial school from the teachers’ perspectives.

**Table 4.4: Main themes, subthemes and foundational topics**

<b>Main Theme</b>	<b>Subtheme</b>	<b>Foundational topic</b>
<b>4.4 Pedagogy</b>	4.4.1 Training	<ul style="list-style-type: none"> <li>- Inadequate</li> <li>- Unfocused</li> </ul>
	4.4.2 Orchestrated learning	<ul style="list-style-type: none"> <li>- Selection</li> <li>- Variety</li> <li>- Time</li> </ul>
	4.4.3 Classroom Management	<ul style="list-style-type: none"> <li>- Time</li> <li>- Scheduling</li> <li>- Classroom size</li> <li>- Learner identification</li> <li>- Differentiation</li> </ul>
<b>4.5 Pedagogical Beliefs</b>	4.5.1 Perceived Challenges	<ul style="list-style-type: none"> <li>- Time in class</li> <li>- Time with device</li> <li>- Training</li> <li>- Scheduling</li> <li>- Support</li> </ul>
	4.5.2 Perceived benefits	<ul style="list-style-type: none"> <li>- Potential</li> <li>- Improvement</li> <li>- Concentration</li> <li>- Stimulated learning</li> </ul>
	4.5.3 Solutions	<ul style="list-style-type: none"> <li>- Additional training</li> <li>- Additional devices</li> <li>- Time on the devices</li> <li>- Rescheduling timetable</li> <li>- Support</li> <li>- Additional Apps</li> </ul>
<b>0.6 Stimulation learning</b>	4.6.1 The potential	<ul style="list-style-type: none"> <li>- Acknowledgement</li> </ul>
	4.6.2 Fit-for-a purpose	<ul style="list-style-type: none"> <li>- Improve concentration</li> <li>- Benefit the learners</li> <li>- Be engaging</li> <li>- Relevant</li> </ul>

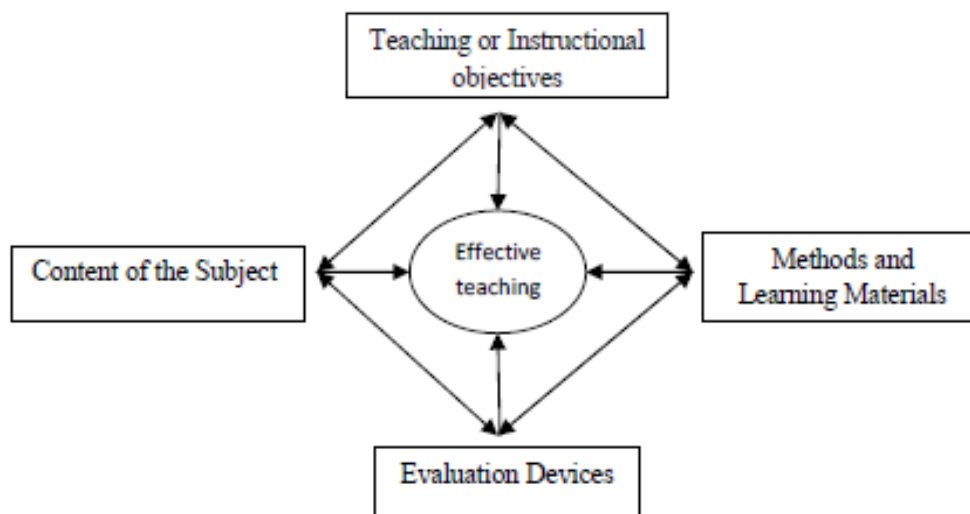
## **4.4 PEDAGOGY**

Pedagogy can be defined as the total environment created by a teacher where the needs of the learners are recognised and understood, and where the participation of the learner in the learning process is enhanced. Pedagogy further refers to the teaching methods, approaches to teaching, the different forms of teaching, and the principles one base teaching and learning on. Pedagogy also includes the beliefs and conceptions of and about teaching and learning (Florian, 2007). It is generally agreed that the most effective pedagogy is where teachers use a variety of teaching methods, approaches, styles and principles to meet the needs of the learners. The learners' skills and knowledge are expanded through appropriate content management and classroom management. When pedagogy is effective, teachers feel empowered and at the same

time learners are affected in a positive manner and learners are able to learn in a more effective manner (Bhowmik, Banerjee, & Banerjee, 2013; Saad et al., 2015; Livingston, Schweisfurth, Brace, & Nash, 2017).

Several potential principles have been recommended to guide effective pedagogy. Principles such as, making sure that learners are engaged and learning in a way that makes sense to them, and which is based on the construction of meaning and knowledge with ample scaffolding opportunities to build on previous learning; choice of relevant curriculum content which is key in developing learner knowledge, skills and attitudes; creating a classroom environment where meaningful interactions may take place; assessment processes aimed at developing learning and understanding and aligned to the selected curriculum content; and finally, the principle of shared respect and trust amongst and between teachers and learners (Bhowmik et al., 2013; Livingston et al., 2017).

To improve pedagogy, teachers need to be supported in several ways. Teachers firstly require high-quality pre-teacher and in teacher training which includes teaching and learning for the 21<sup>st</sup> century. To be able to teach for 21<sup>st</sup>-century learning, teachers need to be trained to select and align different types of knowledge and skills which are required in the 21st-century world. Livingston et al. (2017, p. 6), propose in this regard that “this requires relevant teaching and learning methods and content that meet the needs of all learners, taught by well-qualified, trained, adequately remunerated and motivated teachers, using appropriate pedagogical approaches and supported by appropriate information and communication technology (ICT)”.



**Figure 4.6: Teaching and learning process (Bhowmik et al., 2013, p. 4).**

The analysis of the data in this study, strongly emphasised the teachers need for training. It further revealed the importance of orchestrated learning that is relevant to the needs of the learners and creates appropriate differentiation in knowledge and skills, and lastly classroom management and making sure that there are clear goals and actions put in place.

#### **4.4.1 Training**

Developing teachers' pedagogical skills and knowledge is essential to effective teaching. Pre-service training and in-service training strengthens and supports teachers. It is an ongoing learning process for them. Pre-service training plays the role of developing teachers' foundation. When they receive in-service training it creates the opportunity for professional development and the expansion of existing knowledge. Teachers need the opportunity to share and collaborate on new ways of teaching. They need a platform to discuss challenges and ways to overcome these challenges. Teachers need to be led well and supported to feel empowered and are able to use techniques and methods appropriately (Livingston et al., 2017). The National Education Policy Act (27/1996), states:

Both conceptual and content knowledge and pedagogical knowledge are necessary for effective teaching, together with the teacher's willingness and ability to reflect on practice and learn from the learners' own experience of being taught. These attributes need to be integrated so that teachers can confidently apply conceptual knowledge-in-practice (Republic of South Africa, 2007, p. 24).

This indicates the importance of awareness of the teacher's knowledge both with regards to their knowledge of the content that is taught, as well as their pedagogical knowledge. The expansion of this knowledge is also important as the Act continues to say:

All teachers need to enhance their skills. ... A large majority needs to strengthen their subject knowledge base, pedagogical content knowledge and teaching skills. All teachers need to acquire skills in recognising, identifying and addressing barriers to learning and creating inclusive and enabling teaching and learning environments for all learners, including those with disabilities and other special needs. (Republic of South Africa, 2007, p. 24).

Therefore, continued professional development is vital to the effectiveness of teaching. The South African Council for Educators (SACE) was put in place to make sure teachers receive on the job training and in turn, are rewarded with a certain amount of CPD points. Guidelines for teacher training for ICT 2007 states that "all teachers require the knowledge, skills, values and attitudes, as well as the necessary support, to integrate MLT into teaching and learning, and to support them in their various roles as mediators of learning, interpreters and designers

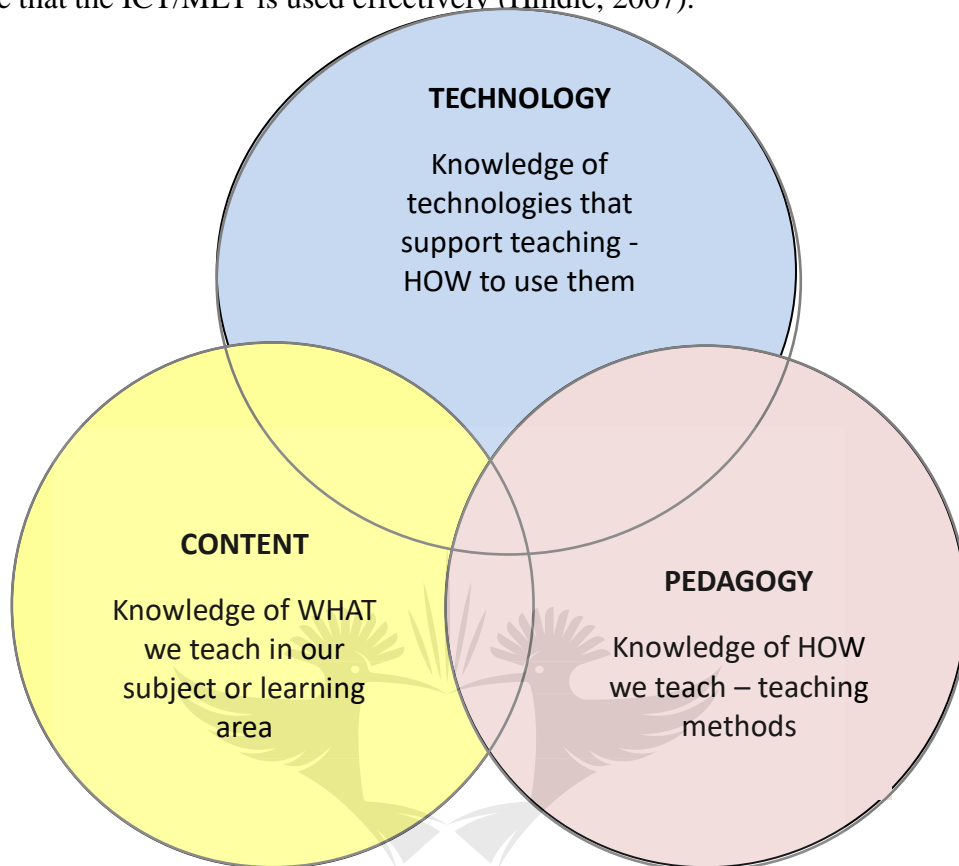
of learning programmes, leaders, administrators, scholars, assessors and subject specialists (Hindle, 2007, p. 1).” Therefore, training and support need to be appropriate.

The following findings from the analysis were noted:

The Grade 1 teacher felt that they can only use what they are trained in and if they are not trained appropriately that they struggle to use the MLT appropriately. This links to the above importance of making sure that teachers are given the training to make their teaching effective (Livingston et al., 2017). Teachers are required to attend to more than merely teaching the content as is often expected in the populist view. As was stated in Section 2.6.2, teachers need to be trained and supported correctly, because what becomes clear is that teacher’s inadequate knowledge can have an impact on their quality of teaching (Nel, 2014; Safaan et al., 2017; Youssef et al., 2015). This is again echoed in the above section where Hindle (2007), states that teachers need access to the required knowledge, skills, values and attitudes that will assist them to teach effectively. The National Education Policy continues from this point, highlighting the importance of continued professional development of teachers. The *Draft White Paper on e-Education* (DoE, 2004), stated that by 2013 every South African teacher and learner, in general, should be using technology such as MLT with confidence and creativity within the learning environment to help develop skills and knowledge, as well as allowing both teachers and learners the opportunity to achieve their potential and personal goals. This document also states the importance of the implementation of ICT/MLT in schools to give teachers and learners the knowledge and skill of working with technology in the 21<sup>st</sup> century. This also relates to the fact that globally we are experiencing the 4<sup>th</sup> industrial revolution. The 4<sup>th</sup> industrial revolution is altering how we live, work and connect to each other. This is a diverse revolution. It is different to what mankind has seen or experienced before (DoE, 2004; Schwab, 2016).

The whole domain of MLT is discussed in Section 2.8 and it concludes that information is a vital resource which we need access to, but the information needs to be appropriate. “Educators who do not experience effective professional development do not improve their skills, and student learning suffers” (Mizell, 2010, p. 6). Beyond this, we see that if effective training is not put in place with the use of MLTs and ICT, teachers will not be able to use the technology effectively. Hindle (2007), set up this diagram (see Figure 4.6) to show the interplay between making sure that teachers understand technology and have the correct knowledge about what they are teaching and the pedagogical processes they follow and finding how these all overlap

to a point of using the ICT/ MLT to support teaching the content (Hindle, 2007). Knowledge needs to be developed in each of these areas and the knowledge gained needs to be appropriate to make sure that the ICT/MLT is used effectively (Hindle, 2007).



**Figure 4.7: The importance of training in three domains of knowledge and understanding the interactions between knowledge of technology, content, pedagogy (Hindle, 2007)**

The Grade 1 teacher commented on this by saying: “We can only use what [we are] trained in” (IT2, L75) and “I think [we need] a bit more training in things that are more appropriate to what we are doing” (IT2, L79, 80).

The Grade 2 teacher echoed the above views but continued to say that she felt that the training needs to be more relevant to the Foundation Phase and that the training needed to occur in a smaller group. In her perception, she felt the training that was given to them was focused on the wrong phase and she felt even though she was computer literate she got lost in the big group training. As she commented, “I think we could have done with more training but maybe as smaller groups because you got lost ... I’m quite iPad competent... preferred it if it was like just the Foundation Phase” (IT4, L 58-61).



This links to making sure that teachers are adequately supported as stated in Section 2.7 by Pavlidis and Giannouli (2014) and Taylor (2011), that both learners and teachers need to be provided with adequate support. This becomes key to creating an environment where learning can take place (Pavlidis & Giannouli, 2014; Taylor, 2011). This continues in the discussion above where Hindle stated the importance of the appropriateness of the knowledge that teachers needed to use MLT effectively (Hindle, 2007). In Section 2.8 MLTs are discussed and the importance of their usage is seen. When we look at both the National Education Policy (1996), and the *Draft White Paper on e-Education* (2004), documents we see that both speak about the importance of the appropriateness and need for continued job professional development. The training that is provided to teachers needs to be relevant and focused. This also links to the fact that if teachers are trained as a focused group that has a specific goal in place, collaborative learning will take place and teachers will find it easier to put in place what they have learnt (Hindle, 2007; Lessing & de Witt, 2007; Mizell, 2010).

The data in the focus group strongly emphasised there was not enough training and that the training was focused on the wrong phase. The participants of the focus group felt that a lot of what they were learning was looking at the Senior phase. The importance of the Foundation Phase is adequately emphasised by Mourshed et al. (2010) and Verbeek (2014), where they speak about the Foundation Phase is the initial stage of schooling which sets the foundation for learning throughout the learners schooling career (see Section 1.1 and 1.2), focusing on developing the foundational skills and knowledge. Thus, if teachers are not well-trained specifically for this phase, and are not using strategies and tools appropriate to this phase, the teachers may experience many challenges where they are ill-equipped, and their teaching and perceptions are affected. This is echoed in Section 4.4 where Bhowmik et al. (2013), Saad et al. (2015) and Livingston et al. (2017), state that effective training impacts on teachers' performance and teaching. Lessing and de Witt (2007), take this one step further and say that if teachers are not trained appropriately, they become disempowered and unmotivated in their tasks. This links very closely to teacher perception and how from their perceptions and their internal goals are they being adequately supported and if teachers start to feel that they are not being supported this can demotivate and disempower them (Tsang & Liu, 2016).

The following comments were made by teachers: *"I don't feel I'm trained enough"* (FGT5, L3); *"We did do training, but the training was based on the senior primary, it wasn't based on*

*junior primary*” (FGT9, L35-36) and *“I feel I’m not doing what I’m supposed to do now”* (FGT5, L192).

The Grade 2 teacher continued and supported the above views of the Grade 1 and 2 teachers in the individual interviews above and stated that she feels neglected. She perceived the training as being focused on the wrong phase and that she as a Foundation Phase teacher is not being supported and is being neglected. She had a clear understanding that MLT could be beneficial to the learners but right now she felt like she was not able to access that potential. She stated: *“I can’t guide them because I haven’t been guided myself or given the opportunity to be guided”* (FGT5, L46).

When teachers perceive something negative, their teaching is automatically impacted (Mart, 2013; Mogodi, 2013) (see Section 2.8). This is also echoed by Lessing and de Witt (2007), who state that the effectiveness of teaching and the success of the CPD workshops and training can be heavily impacted on by the teachers’ perception of that workshop, whether it met a need, was relevant and applicable or was fun and easy to understand and apply (Lessing & de Witt, 2007). *“Poorly conceived and ineffectively implemented professional development leads to complaints”* (Mizell, 2010, p. 20).

One teacher stated that: *“I sometimes feel the Foundation Phase is neglected in that regard and the kids can actually benefit”* (FGT8, L159). It is clear from these comments that the teachers in this study are prepared to open themselves up to development opportunities for the benefit of the learners; as Mizell notes, *“when educators learn, students learn more”* (2010, p. 19). It is also very clear that when teachers are committed, they are always focused on their end goal which is to make a difference in learners’ lives (Mart, 2013). This also strongly relates to the need for ADHD learners to have committed teachers to help them overcome their barriers as discussed in Chapter Two. Section 2.6.1 highlights the many challenges that ADHD learners face and that their whole schooling career can be frustrating (Nelson, 2007). In Section 2.6.2 we see that there is a deeper need for support for these learners and the vital role players are teachers, as parents look to them for help and guidance (Nelson, 2007; Parker, 2001; Pavlidis & Giannouli, 2014).

Many of the teachers can feel frustrated as they can see the need for support but are not provided with the support they need themselves. In Section 2.2, inclusion is discussed and part of the WP6 emphasises that learners need to be included in the classroom no matter what their barrier

to learning is; yet, inclusion does not stop there. It also speaks about the importance of teachers being provided with the correct support because everyone including teachers and learners requires support (DoE, 2001). Above we also see that Mizell (2010), Mart (2013) and Lessing and de Witt (2007), all highlight the importance of effective and relevant support is provided and how teachers view this support and training will ultimately impact on the effectiveness of the training as well as the impact on the learning of the learners long term. Teachers expressed their frustration in this regard saying, *“to explore a bit more, as a teacher, we’d be able to use it more effectively.”* (IT1 L24, 25) and *“I feel we could do a lot more”* (IT4 L13).

The focus group as a group answered very explicitly in the negative when asked if the iPads are being used to their full potential (FG L155).

#### **4.4.2 Orchestrated learning**

According to Mackenzie (2003), pedagogy implies several critical questions related to learning, to the teacher’s practice and to the resources needed for the learning to occur. With reference to the learning, teachers need to carefully assess what learning is needed and how a class culture for learning is developed. Regarding own practice, teachers need to make decisions on the approaches, strategies and methods they will employ to achieve the learning, keeping in mind what problems may arise and how to cope with them and to learn from these and better their own practice. The teacher is indeed the orchestrator of all that happens in the classroom to affect learning.

Part of the teacher’s pedagogy and the process of effective teaching according to the participants of this study, is that teachers are charged with selecting and managing the content to be taught, but also have to orchestrate how this learning is affected, particularly through being given more agency to decide on the resources needed, as well as the teaching arrangements specifically related to teaching and learning time (Alexander, 2009; Bernstein, 2000; Watkins & Mortimore, 1999). This idea of management and orchestration point to pedagogy. Alexander (2009), states that pedagogy consists of ideas, beliefs, attitudes, knowledge and understanding about the content, the teaching, the learning process and the students. The way teachers think and what they believe is therefore impacted on by their pedagogical approach (Westbrook, et al., 2013). Beyond this, there is an alignment between the idea of insightful thinking and the social constructivist approach discussed above and the idea of pedagogy.

The teachers in this study specifically mentioned the process of evaluating the topics and single concepts that were being taught through the use of the device, the consideration of the setting in which they were teaching, and the objectives they were trying to reach, as issues they were dealing with. This is mentioned above by Westbrook et al. (2013), who state that not only is content important but so is context. The context itself impacts on the outcomes of teaching. This is also linked to Section 1.5, which discusses the theoretical framework of this study. There, Bronfenbrenner (1979), stated that a holistic approach needs to be put in place and that goes for teachers as well as learners. Their interacting systems need to be considered to understand why a certain action is occurring.

Analysis of the data revealed that teachers perceived that the time allocated in the school timetable was a challenge. They also felt that due to this time limitation, it became a challenge to use the mobile learning device for what it was meant for, as the content they wanted to cover was not being covered in the time frame. The teachers were finding that they did not have enough time in the lessons to use the devices as they should be used; they also felt like there was limited goal orientation and the lessons became a waste. They were not able to use it as an effective content tool. Two teachers noted: *“I don’t think there is enough [time] to be quite honest”* (IT2 L14) and *“I don’t think they have enough time with just half an hour”* (IT4 L70).

The focus group data echoed this opinion: *“And your time is limited”* (FGT6 L142); *“Your time is limited”* (FGT8 L143) and *“You’ve got half an hour”* (FGT9 L144).

As the MLT and its associated apps were mainly the resources used in the support of the learning in the case of this study, the teachers appeared to feel that the current way of implementing the devices, apps and activities, meant that the effectiveness of their teaching was compromised.

The teachers believed they could only teach content in a specific time and to a specific schedule and if a tool, app or technique did not fit into this time, it became a challenge to use it effectively. The above points to the importance of how teachers perceive situations and that when they view situations in a negative light it can impact on the effectiveness of teaching. This is stated in Section 4.3 by Westbrook et al. (2013). The way teachers think and what they believe is therefore impacted on by their pedagogical approach (Westbrook et al., 2013). Therefore, if teachers time in a system is pressured that will impact on their motivation and teaching (Lessing & de Witt, 2007).

Teachers in this study felt that if the one they do not have a clear goal or reason to teach something, or for using a specific method, they become unsure of the instructional objectives and what they are trying to teach, which could lead to demotivation. Teachers felt the need for good selection and employment of materials and resources, and that they are used in the best possible way. It thus appeared from the analysis that they felt the need to be in control of the content being taught. This links to McNamara et al. (1997), who state that included in the encouragement of teachers and learners, is to allow teachers to become self-directed and allow them to take control of their learning and their processes. This links to pedagogy, as well as to the concept of teacher agency and autonomy. “Agency is seen as the conscious act of allowing oneself to be free and released from authoritarian control” (Swartz, 1996, p. 400). “Autonomy affords teachers with choices to adopt, adapt, or reject an instructional reform” (Ertmer, 2014, p. 7). According to Hodkinson and Sparkes (1993), both these concepts allow teachers to be viewed holistically which is mentioned above (Bronfenbrenner, 1979). Teachers have the choice of how to implement and what to implement when using a new instructional method or piece of content. Lawson (2004) and Ertmer (2014), state that for teaching to be effective, pedagogy needs to be effective, which includes the teacher’s ability to act with autonomy and agency.

The teachers also had opinions about how appropriate the apps were and that they needed time to select them and work with them. Teacher agency in planning and selecting appropriate apps are central to teachers developing and extending their own pedagogy (Livingston et al., 2017). From the analysis of the data it is quite clear that the teachers in this study are convinced of the value of MLT and its Apps, but are of the opinion that if the Apps are not considered carefully and selected for specific purposes, taking into account the relevance and applicability to the uniqueness of the learners, then the use – accompanied by the challenging time frames – may not be very beneficial. Teachers from Grade 1, 2 and 3 reported in the individual interviews that: “*bit of a waste of time*” (IT2, L5); “*I think we need more apps*” (IT2 L14); “*I don’t think we have enough apps*” (IT4 L5-6) and “*I think we as teachers need to take more time to try and find apps that we could use more in the classroom that will be more beneficial towards our teaching*” (IT1 L44).

Data from the focus group interview echoed these opinions. “*If you have the right apps, it’s definitely going to be a benefit. But I don’t think we’ve got what we want*” (FGT6 L56).

In the analysis of the individual interview data it became apparent that in certain grades and for specific subjects, they required Apps that were more relevant and related to the subjects, specific aspects of learning, as well as their learners' needs. The Grade 3 teacher for instance, said the following: *"I think we can do with more support with the literacy, with the reading and use it more in a variety of ways"* (IT1 L22-23) and *"We use the same apps all the time we need more apps"* (IT1 L45-46).

The teacher from Grade R said that it was important that they are given time with the devices so that they could work on the Apps and plan lessons that are appropriate. The differentiation and specific subject support are being lost in the process of using the MLTs. *"It's very difficult to teach on a tool that you only see for half an hour a week. You can't actually use it as a tool for teaching"* (IT3 L47-48). The focus group agreed, *"there isn't time to prep"* (FGT4 L50).

It is therefore clear from the analysis that teachers felt that their expertise and ability to orchestrate the learning as conceptualised by Mackenzie (2003), was a challenge.

#### **4.4.3 Classroom management**

Part of the process of effective teaching is to manage the challenges that come with teaching a classroom of learners. The teachers themselves need to be aware of the needs of the learners in the classroom and need to be able to encourage the different groups that they are faced with in any given lesson. Part of the teacher's responsibility is to manage the differentiation and the preparation for these learners making sure that in any given week they are bringing a deeper understanding of the curriculum to the learners they are teaching (Livingston et al., 2017).

One of the key aspects was that teachers can identify ADHD learners in their class. In Section 2.6, the importance of a teacher identifying the ADHD learner and their needs was discussed (Decaires-Wagner & Picton, 2009; Parker, 2006). Two teachers noted: *"I have three learners in my class diagnosed with ADHD"* (IT1 L33) and *"I've got quite a few ADHD in my class. Probably six out of 10 are ADHD and on meds"* (IT2 L44).

In Section 2.6.1, it was explained that learners with ADHD struggle with impulsivity and distractibility (APA, 2013). This was brought up in the focus group interview: *"But for me with planning, because I think a lot of them have planning ... because they're so impulsive and in a hurry or..."* (FGT8 L110).



Analysis of the data indicated that teachers participating in this study perceived the MLT and its associated apps as supporting the learners and having a positive impact and that they could clearly see the benefit of using the devices. The teachers see the devices as having potential (Florian & Hegarty, 2007; Frazier, 2014; Serero, 2010; see Section 2.8). They made the following observations in the focus group interview: *“I think it’s very, very beneficial”* (FGT5 L122) and *“I can see the benefits of it, and for the children, I can see the benefits of it. But I need that actual one-on-one time with an iPad to figure out the games”* (FGT5 L39-40).

An important point is made by the Grade R teacher, stating that in the first place that the learner’s concentration was held while using the apps. This is an indication of the benefit provided by the use of MLT and associated apps for learners presenting with ADHD. Section 2.6 stated that learners with ADHD struggle with concentration (APA, 2013; EPA, 2013), and in Section 2.6.2 that there was a need for interventions that could support these learners within the classroom environment to overcome the barriers they face in the traditional class, where they have to sit and listen to a teacher teaching for long periods of time (Cota, 2008; DuPaul & White, 2006; Decaires-Wagner & Picton, 2009; Nelson, 2007; Parker, 2001). The Grade R teacher expressed that: *“Oh, concentration on the app... on the iPads is much better. I don’t have any concentration issues at all even though it’s at the end of the day ... Concentration on the app is much better”* (IT3 L38-39).

It appears that the Grade R teacher felt that the learners presenting with ADHD were engaged and enjoyed the learning experience. Theory suggests that the second area that was applicable to learners with ADHD is that the learners were engaged and having fun in the learning during the iPad lesson. Again, referring to Section 2.6.1 we see that these learners can become frustrated in the learning environment and demotivated and with iPad learning we see the learners enjoy the learning (Cota, 2008; Decaires-Wagner & Picton, 2009; DuPaul & White, 2006; Nelson, 2007; Parker, 2001). The Grade 3 teacher confirmed that they: *“enjoy it more than just the normal, conventional, sitting-behind-the-desk”* (IT1 L36) and that they *“learn in a fun way... they want to learn on an iPad ... It is more exciting”* (IT1 L40,38,37). She also thought that they *“play better and learn through play... Learners are excited”* (IT1 L17, 18,28).

Teachers in this study, once again were of the opinion that the timetabling conventions of the school made it difficult to use the MLT and associated apps to its full benefit. If time in the day is not allocated appropriately, lessons can seem to be a waste, so appropriate timetable planning



needs to take place. This links to making sure that teachers are appropriately supported by management who sets out the timetables; Section 4.4. stated that the systems in which teachers operate each impact on the effectiveness of teaching and this includes pedagogy, context, policy, training, autonomy, agency, knowledge of learners and their own personal beliefs (Alexander, 2009; Lessing & de Witt, 2007; Mart, 2013; McNamara et al., 1997; Mizell, 2010; Tsang & Liu, 2016). Section 2.6.2 also suggested the importance and need for teachers to be supported (Nelson, 2007; Pavlidis & Giannouli, 2014; Parker, 2001). The lessons should also never be scheduled at the end of the day. This was the view of the Grade R teacher: “*iPad lessons at the end of the day... kids are finished*” (IT3 L24,25) and the Grade 3 stated: “*I don’t find it to be enhancing or making my teaching any better*” (IT1 L29).

The teachers highlighted an important content management skill which is highlighted in Section 4.3 that links to pedagogy and the fact that teachers need to be able to appropriately select and manage the content they teach but beyond that, they need to be able to decide how they teach that content – that means making sure that lessons are prepared so that the content is appropriately selected for the learners. This relates to the challenge they currently find themselves in where the apps they currently have are not appropriate and they need time to plan and find new apps to use. Part of the challenge here is that many of the teachers have been given the devices at school just for their 30-minute lesson allocated on the timetable – trying to find another time to work on the iPad is challenging and most do not have the option of looking at the apps at home. “Lesson planning allows teachers to explore multiple aspects of pedagogical content knowledge” (Shen, Poppink, Cui, & Fan, 2007, p. 248). Preparation and planning could improve their teaching practice and in turn improve learners learning (Shen et al., 2007). This means that when teachers are not allowed ample time they need to prepare for lessons, the learners learning is impacted, and teacher cannot carry out teaching effectively (Su, Qin, & Huang., 2005). The Grade R teacher commented: “*You can’t actually use it as a tool for teaching because you can’t prep. And with the little ones, the prep has to be quite extensive*” and that “*The teacher needs access before the lesson, so we can actually set up the lesson*” (IT3 L43,47).

The Grade R teacher noted that: “*If we take more time to find things, then I’m sure it will help our teaching, but you also mentioned that the limitation of not having your own iPad to use ... to have that time to do*” and that “*teachers need to take more time to try and find apps*” (IT1 L43,46,47). The Grade 1 teacher agreed:

*I would need time to work on the iPad and find all the apps and find them... We should be allowed to maybe be able to... I don't understand why we can't download all... actually, download an app that would benefit our children. (IT2 L66-68)*

The analysis of the focus group data supported these findings, with the main issues mentioned being the time to dabble in the use of the MLT and associated apps, as well as the expertise or ease of use of the MLT. Teachers' views were that: *"You can't give someone a tool without letting them have the opportunity to actually practise it themselves. Especially when you're aged like myself and I don't have an iPad at home"* (FGT5 L37-38). Another view was:

*I don't have time to go and sit and play the games myself or experiment and see what I like because I don't have admin periods and then I also don't have my own iPad. So then, how am I supposed to enrich my kids? (FGT8 L26)*

From this data, we also go back to the concepts of pedagogy, agency and autonomy that are mentioned in Section 4.3. Agency implies that teachers want the ability to practice working with the device and seeing what works and what does not (Swartz, 1996). The autonomy which is the ability to critically look at the use of MLT and decide how best it could be applied to assist learners, looking closely at the adoption and adaption of the MLT in the learning context (Lawson, 2004; Ertmer, 2014).

An interesting aspect that was discussed by the Grade one teachers was the fact that their classroom size in Grade 1 makes it very difficult to manage a whole class on iPads. One of the teachers spoke about it becoming a frustrating experience as she just manages to get all the learners logged into one of the apps only to find that one of the learners has accidentally logged themselves out again. She found it challenging to get to all the learners and help them with questions and activities. She spoke about making sure that she got help during this lesson. The interesting thing was that the Grade 1 teacher in the focus group and the Grade R teacher also spoke about the challenges of logging learners in and not having the time to assist all the learners in the class, so they would avoid those apps altogether or resort to letting the learners just play. Some focus group comments were: *"You can't get to everyone in that time, and then you get a kid that's really frustrated"* (FGT6 L145) and *"So, if we could split the class into like half or split it into three groups and work like that it would definitely be more beneficial"* (FGT8 L138).

## 4.5 PEDAGOGICAL BELIEFS

What teachers believe about teaching, the learners, themselves and the profession is a fundamental issue that teachers need to confront when they make decisions on whether they want to use technology for instructional purposes and how to use it (Ertmer, 2014). A number of views of what ‘teacher pedagogical beliefs’ are can be found in the literature. Ertmer (2014) mentions Pajares (1992), who labelled it as a ‘messy construct’, whilst Calderhead (1996), integrated beliefs into a larger concept of ‘teacher cognition’. Ertmer (2014), supports Calderhead’s view that beliefs are suppositions, commitments and ideologies that influence what teachers believe to be knowledge and good practice. A strong effective and evaluative component is often found in people’s beliefs, generally due to experiences, and is a strong predictor of their behaviour, in this case, whether and how they use MLT and the associated apps (Ertmer, 2014). It is clear from the literature that the beliefs of a teacher will have a continuous effect on teaching decisions and interactions and their use and selection of curriculum. This will in turn impact on the students and their learning. When teachers can see the benefits of using a method or technique to help a learner acquire a skill or knowledge, teachers will be more committed to problem-solving and understanding and growing their knowledge (Venter, 2013).

Teachers’ pedagogical beliefs may underpin their frustrations and challenges in implementing MLT and associated apps and should be taken into consideration. One way to address the influence of pedagogical beliefs may be through collaboration and communication through sufficient training, management, planning and systematic goal setting. As much as teachers create a nurturing environment for learners, teachers and their experiences are important and teachers themselves need to be nurtured (Alexander, 2009; Lessing & de Witt, 2007; Venter, 2013).

A positive learning environment is crucial for learning, and such an environment relies on teachers’ beliefs about the learner. If teachers believe that a learner is capable, they tend to focus on learners’ strengths and interests and use these to increase the effectiveness of teaching. Teachers also draw from their own strengths and understandings, and carefully consider learners, their cognitive, emotional social and behavioural aspects before implementing teaching strategies. There is an understanding that learners need to be actively engaged and that teachers build on already constructed knowledge. Teachers build and construct teaching

methods that are effective through the analysis and assessment of methods that they put in place (Bhowmik et al., 2013; Livingston et al., 2017).

The analysis of the data indicated that teachers are faced with perceived challenges and perceived benefits of using MLT and its associated apps. The teachers also problem solved and came up with their own set of solutions to the problems. They were quick to identify that the current process and implementation in their perception are not working but that the benefit to the learners far outweighs the scrapping of the idea. Alexander (2009), Ertmer (2014), Lawson (2004), Swartz (1996) and Hodkinson and Sparkes (1993), look at teacher perceptions and beliefs, understanding that there can be a dramatic impact on pedagogy, agency and autonomy which in turn will impact on their teaching and in turn impacts on the learners learning. Beyond this, we see that teacher's motivation is impacted on by their perceptions and beliefs of context and circumstances (Lessing & de Witt, 2007; Tsang & Liu, 2016).

We are also aware that teachers' beliefs about learners and their understanding of the ADHD learner impacts on teaching and learning (Nel, 2014; Wolf, 2006). They all wanted to continue using the devices, just with the implementation of some of the solutions they had come up with which can be associated with their beliefs about their own commitment to teaching and supporting learners presenting with ADHD, as well as their belief in the potential of these learners to learn and develop.

#### **4.5.1 Perceived challenges**

Teachers found that it was challenging to teach with a device where they did not have adequate training and time with the device to learn how to use it, as well as having the time to put together lessons that were effective and met the needs of the learners in the class. The Grade 2 teacher commented that there was *"no time at school to look at apps"* (IT4 L51).

They felt that the lessons were too short and were inadequate to accomplish a given goal, with many of the teachers saying that the lessons became pointless and they felt they were not doing what they were meant to. Teachers stated: *"I don't think they have enough time with just half an hour"* (IT4 L70) and that *"... your time is limited"* (FGT6 L142).

In Section 4.4, we see the importance of teachers following a process to put in place effective teaching, making sure that steps are in place relating to the realisation of goals, making sure there is detailed planning which in turn results in effective teaching (Bhowmik et al., 2013).

Alexander (2009), Ertmer (2014), Lawson (2004), Swartz (1996) and Hodkinson and Sparkes (1993) also state the importance of looking at a teacher holistically and understanding that a teachers' perceptions and beliefs of the context they find themselves in will impact on their pedagogy, agency and autonomy, which in turn will impact on their teaching.

The apps that were on the devices were not selected for all grades and all the needs of the learners. All the teachers interviewed individually and in the focus group stated that there need to be more apps and more appropriate apps. The teachers' need to select appropriate applications, their confidence in using MLT and their perception of MLT effectiveness, are all linked to their beliefs, which Alexander (2009), states are vital to effective teaching. In section 4.3, we also see that Ertmer (2014), Lawson (2004), Swartz (1996), Hodkinson and Sparkes (1993), speak about empowering teachers by looking at what they believe and letting that motivate their direction, encouraging pedagogical, autonomous and agency practices. This links to having an effective process in place that helps teachers select appropriate apps that are applicable and that can differentiate to support learners needs. This was discussed in Chapter Two by Lee and Kim (2015) and Apple Inc (2014). One comment in this regard from the focus group was: “[the apps] need to be able to differentiate (FGT L66).

There was not enough support in the classroom to assist with the younger learners because they needed more help to log in and time again became a problem. Teachers avoided using apps that required them to log the learners on. Teachers complained that learners were “*too young to copy codes off the board*” (IT2 L37,38) and that “*They can't log in themselves*” (IT3 L19).

In section 4.3.1, pedagogy is discussed and the importance of supporting teachers and making sure they are equipped is highlighted as vital to effective teaching (Lessing & de Witt, 2007; Livingston et al., 2017). When teachers believe that they are not able to act autonomously and use an agency to think for themselves, this has a negative impact on their motivation and their teaching (McNamara et al., 1997; Westbrook, et al., 2013). This also links to the understanding that was identified in Chapter Two where the WP6 states that all teachers and learners need to be supported to make sure that access to the curriculum takes place (DoE, 2001).

Section 2.2 discusses inclusion and in the WP6 it is important to meet learners' needs and to make sure that they receive the needed support to help them overcome their barriers to learning (DoE, 2001). The SIAS document speaks about the importance of looking at the strengths and weaknesses of a learner and tracking what is needed and from this putting in place the correct

support structures (DoBE, 2014). Beyond this, we also see that part of the learning process is making sure that scaffolding is put in place which is discussed in Section 2.5. Vygotsky (1978), discusses the importance of making sure learners learn from a firm foundation moving from concrete knowledge to more abstract knowledge, building on the knowledge they already have. (Pound, 2006). If their developmental age does not allow them to do certain tasks the teacher needs to be allowed through autonomy and agency and her pedagogical knowledge to adapt the teaching to better suit the learners (Alexander, 2009; Bernstein, 2000; Ertmer, 2014; Hodkinson & Sparkes, 1993; Lawson, 2004; Lessing & de Witt, 2007).

There needs to be a reason and goal as to why teachers are using the apps. Many of the teachers pointed to the fact that they felt that the iPads and Apps were not living up to their potential and are not necessarily currently meeting the needs of the learners. The Grade 3 teacher commented that the technology is “*not used to [its] full potential ... could do more*” (IT1 L24-25).

Tsang and Liu (2016), state that teachers want to make a difference and Lessing and de Witt (2007), state that teacher motivation and perceptions impact on the learners learning. If teachers can see that a tool will make a difference, they will be motivated to use it. Mogodi (2013), states the main reason that ICT is not successful is teacher knowledge, perception and training. UNESCO’s (2005), *Information and Communication Technologies in Schools: A Handbook for Teachers*, echoes this statement.

There was too much focus in their opinion on the senior phase and not on the foundation phase and that this had to do with support and training. This is an important feature as we see in Section 2.6 where Mogodi (2013), highlights the importance of teacher’s perceptions, stating that the interaction between the teacher and the MLT is key to its successful use as a supportive tool. In the same section, we also see that when teachers have a negative view or perception this can impact on their overall teaching, as stated by MacArthur and Malouf (1991), Moore et al. (1994), Ludlow (2001), Richardson (2014) and Mogodi (2013). Some comments from the focus group interview confirmed that they do not get the support they need: “*The school says it’s too expensive, I don’t want that app use this – they block you*” (FG L48, 49) and the Grade R teacher asserted that “*The computer teacher helps seniors with iPad lessons but not in Foundation Phase*” (FGT8 L176-181).



#### 4.5.2 Perceived benefits

The research also indicated that there were elements that made the use of iPads beneficial and the teachers could see its potential. The advantages were an increase in attention as highlighted by the Grade 3 teacher: *“It captures attention...”* (IT1 L 37) and *“Concentration on the app is much better”* (IT3 L38).

They see learning as fun and they want to learn on the device. Gardner’s theory of multiple intelligences is discussed in Chapter Two which points to the importance of understanding and knowing how learners learn and where their strengths and weaknesses are (Armstrong, 2009). The above knowledge of each learner and their learning style will improve their learning and their experience of learning overall (Venter, 2013). This is important for ADHD learners who are becoming demotivated and frustrated in the school setting as stated in Chapter Two by Tree (2008) and Parker (2001). Some teachers expressed that the learners, *“learn in a fun way ... they want to learn on an iPad ... It is more exciting”* (IT1 L 40-38-37) and that they *“play better and learn through play ... Learners are excited”* (IT L17,18,28).

The Grade 2 teacher had a wonderful reflection despite the challenges. She stated that she had *“... seen progress. When they started at the beginning of the year, they couldn’t do them. Now they are able to play the game and get the answer right”* (IT4 L 38-40). This links to Tsang and Liu (2016), who referenced Hao and de Guzman (2007; Lai, Chan, Ko, & So, 2005; Lam, 2011; Schiefele, Streblov, & Retelsdorf, 2013) stating that it seems that the most important goal shared by teachers is making a difference in students’ lives.

In totality, the teachers could see the potential in the use of the devices. This is linked to the fact that they expressed the following sentiments: *“can make a difference”* (IT1 L46); *“can benefit learner”* (IT2 L68); *“can be beneficial to teaching”* (IT3L 26,27); *“the right apps will benefit the learners* (FG L56,57); and *“I see the potential and benefit to the kids”* (FGT5 L39,80).

#### 4.5.3 Solutions

Teachers are by nature problem solvers and throughout the process of the research, the teachers gave their own solutions to the challenges and problems they faced with the use of MLT. The interesting aspect is that despite all these challenges the teachers saw such potential in the use of MLT that the challenges did not seem insurmountable.



The teachers suggested first and foremost that there needs to be more specific and focused training. They expressed the following: *“more training”* (IT2 L84); *“more focus on specific phases”* (IT4 L65); *“teachers need to get more knowledge on how to use the devices”* (FG L27,28,31,32) and *“training wasn’t based on the Foundation Phase”* (FGT9 L35,36).

They wanted more time to get to know and play on the apps. The importance of selecting an appropriate app is key to the success of its use as a supportive tool (Shuler, 2012). Lee and Kim (2015), stipulate that the selection of a good app is vital. The challenges that we as people face is also spoken about by Lee, where he states that accessibility of the app is of vital importance, the requirements that people look at relating to cost, what platforms you can access it on, etc. The above links closely to the aspect of economy and ethics advertisements, cost, and quality of the app. This is also linked to the school not wanting to purchase apps and blocking the downloads. The following were expressed by the teachers: *“more time to look at apps”* (IT2 L69); *“need more apps”* (IT1 L45); *“allowed to download apps and try them”* (IT2 L66) and *“need right apps”* (FGT8 L161).

They wanted more time with the MLT themselves to plan and prepare for the lessons. In Section 4.3.1 pedagogy is outlined as an important process whereby teachers put in place processes and structures to direct their lessons. Bhowmik et al. (2013), state that the importance of a teacher setting up a nurturing environment is key to effective teaching but this involves having clear ideas when setting up experiences for learning. Lee and Kim (2015), also state that skills should be targeted, and there should not be too many skills being used/taught at once. A good app should also be able to be personalised for each individual learner. In this regard the teachers expressed the following: *“Need more time with device to find apps”* (IT1 L43,47); *“Teachers need access before the lesson”* (IT3 L47) and *“but I need that actual one-on-one time with an iPad to figure out what the games are”* (FGT5 L40).

## **4.6 STIMULATION LEARNING**

Sensory Stimulation Theory is based on the idea that effective learning happens when learners are engaged in learning that is stimulating their senses. This means that they are engaged in learning through touch, hearing and seeing. This process is said to link to enhancing teaching and looks at using media and other techniques to assist learners. This also relates to Gardner’s theory of multiple intelligences pointing to the importance of understanding and knowing how learners learn and where their strengths and weaknesses are

(Armstrong, 2009). This brings about the understanding that each learner has a learning style preference and that learning in the learning style where the learner's strengths lie will improve their learning experience. (Venter, 2013). The diagram in Section 2.1.6 outlined all the intelligence.

#### **4.6.1 Beneficial potential**

Throughout the process, every single teacher in the focus group and in the individual interview said they could see the potential and benefit of MLT. This is an important feature as we see in Section 2.6 where Mogodi (2013), highlights the importance of teachers' perceptions of using a device and that when teachers do not see something as positive, this can negatively impact on their teacher. See Section 1.3 where MacArthur and Malouf (1991), Moore et al. (1994), Ludlow (2001), Richardson (2014) and Mogodi (2013) state that the interaction between the teacher and the MLT is key to its successful use as a supportive tool. Teachers confirmed that MLT *"can make a difference"* (IT1 L46); *"can benefit learner"* (IT2 L68); *"can be beneficial to teaching"* (IT3 L26,27); *"right apps will benefit the learners (FG L56,57) and "I see the potential and benefit to the kids"* (FGT5 L39,80).

#### **4.6.2 Fit-for-purpose**

Fit-for-purpose is a common term used to indicate an ideal set of service provided, of processes followed, of products used. It also implies that whatever is seen to be fit-for-purpose will be somewhat subjective and will be focused on an end goal (Patrick, Worthen, Truong & Frost, 2018). The focus of this study was on teacher perceptions of the use of MLT and associated apps to support learners presenting with ADHD. Learners with ADHD are defined as having the following criteria associated with impaired levels of inattention, disorganisation, and hyperactivity-impulsivity. The inattention and disorganisation include the inability of these learners to stay on task; they can present as not listening, they tend to be disorganised and will continuously be losing materials. These impairments are at levels that are inconsistent with their age or developmental level (American Psychiatric Association, 2013). The analysis of the data suggests teachers recognise the fact that MLTs and its apps are indeed 'multisensory' and engage learners with ADHD at different levels of concentration, attention and focus (Florian & Hegarty, 2007; UNESCO Institute, 2006). The element that brought teachers back to wanting to use the MLT is that it held the ADHD learners' attention. This is of vital importance as brought out in Section 2.6.1 and 2.6.2 which identifies inattention as a barrier to learning for an ADHD learner. The teachers in this study believed that MLTs and its associated apps were

exactly the right support they needed as it focused the children's attention and assisted them to concentrate better. They noted the following: *"captures attention..."* (IT1 L37); *"Concentration on the app is much better"* (IT3 L38) and *"Oh, concentration on the app ... on the iPads is much better. I don't have any concentration issues at all even though it's at the end of the day"* (IT3 L38-39).

Therefore, using a device like an MLT can allow the learners with ADHD better access to the curriculum while using the devices. This is reinforced by previous studies that noted the potential of these devices (see Section 2.8). *"ICT embraces inclusive education by providing added opportunities, alternative methods of instruction and flexible assessment"* (Serero, 2010, p. 15). Therefore, ICT has the potential to meet the needs of ADHD learners (Florian & Hegarty, 2007). Teachers use the iPad for differentiation, but there is also the need to develop the usage of iPads to be more engaging and most importantly help learners to learn (Frazier, 2014).

This also aligned with the importance of engaging and motivating these learners. Teachers performance is a critical part of their learners' engagement and motivation (Hill & Rowe, 1996; Stephens, 2015). Martin (2006), highlights teacher's satisfaction and self-confidence in teaching, as well as beliefs, pedagogical effectiveness, and emotional state within the classroom that have a positive influence on learners' engagement and motivation (Martin, 2006; Stephens, 2015). Teachers felt learners wanted to learn in this form and found it fun. This also links to the section in Chapter Two where Lee and Kim (2015), stipulated that apps need to focus on teaching and learning: the app needs to be interesting, as well as create a good level of motivation, self-directedness and have accessibility to the curriculum. This means that learners must enjoy the app and be able to interact and receive incentives for continuing to play. It must create an environment where cooperation and competition are present. This also helps learners with ADHD because it is interesting and holds their attention which as explained in Section 2.6.1, is useful as learners with ADHD struggle with attention (APA, 2013). The teachers also confirmed this: *"I think also it's multisensory, so it can be, and it can add a lot of value"* (FGT8 L58); *"learn in a fun way ... they want to learn on an iPad ... It is more exciting"* (IT1 L 40- 38- 37); *"play better and learn through play... Learners are excited"* (IT L17,18,28) and *"enjoy it more than just the normal, conventional, sitting-behind-the-desk"* (IT1 L36).

They found that the learners were engaged. This meant that they were learning tasks that they found challenging in the past which suddenly through play and engagement they were able to

do. A strong sense of socio-cultural and mediated learning as proposed by Vygotsky (1978), Piaget (1977) and Bruner (1957), were implied by the use, value and fit of the MLT and apps as the Grade 2 teacher commented that: “...seen progress. When they started at the beginning of the year, they couldn’t do them. Now they are able to play the game and get the answer right” (IT4 L38-40).

Learning through social interaction, and in playful interaction with the world around them, allowing the learners presenting with ADHD to acquire greater autonomy and control over their own learning, possibly through the interaction and scaffolding afforded by the MLT and associated apps they were exposed to.

## **4.7 CONCLUSION**

In this chapter, all the data was analysed in the phases as outlined by the protocol, as set out in the data analysis process table. After the interviews were transcribed, the researcher familiarised herself with all the data. Thereafter, parts that seemed relevant and similar were underlined and colour coded in different colours. These pieces of information were then categorised according to similarities and labelled as specific themes. After analysing the initial themes and grouping them again, the themes were refined as all the interviews were collectively looked at. From these refined themes, subthemes were derived and then named. These subthemes were then further analysed to be redefined as main themes. The themes that were identified were pedagogy, pedagogical beliefs and stimulated learning. Each of these themes also had subthemes. These entailed time, orchestrated learning, classroom management, perceived challenges and perceived benefits. These themes will be discussed in Chapter Five that follows.

## **CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 INTRODUCTION**

The aim of this study was to explore and describe Foundation Phase teachers' perceptions of using mobile learning technology and its associated Apps to assist learners with ADHD in a private remedial school. The research question was aimed at obtaining information about the usage of mobile learning technology with ADHD learners. The questions gained information regarding what the teachers in the Foundation Phase are using, why they are using it and how they are using it. It also included their perceptions of its usage and how they experience using the devices, as well as the benefits and the challenges that they are facing.

In this chapter the findings will be summarised, conclusions drawn from the findings and recommendations for practice and future research will also be mentioned. A critical reflection on the study will also be provided.

### **5.2 SUMMARY OF THE FINDINGS**

This research looked at the Foundation Phase teachers' perceptions of using mobile learning technology and associated Apps to assist learners with ADHD in a private remedial school. This school implemented the use of MLTs and its associated applications during 2017. Part of the implementation process was to offer training during that year. The iPads were used during a timetabled lesson for 30 minutes once a week.

The research was conducted through interviews and a focus group. The data were analysed and there were initial topics that were identified. These initial topics were divided into subthemes which were further categorised into main themes.

The analysis of the data indicated that teachers viewed aspects related to the pedagogy of teaching and learning as important aspects when considering the use of MLT and its associated Apps with learners presenting with ADHD (see Section 4.4). Teachers identified training as one of the challenging aspects in this respect. They perceived training received as inadequate and unfocused and expressed the need for training which was more relevant and focused on the particular grades and learners being supported (see Section 4.4.1).

Orchestrated learning looked at the selection of the applications, the variety of applications and the time required to manage the selection (see Section 4.4.2), which linked very closely to pedagogy, agency and autonomy of the teachers (Ertmer, 2014; Lawson, 2004; McNamara et al., 1997; Swartz, 1996). All of these had a dramatic impact on the motivation and practical implementation of the MLT and its associated applications by the teachers (Hodkinson & Sparkes, 1993; Lessing & de Witt, 2007; Watkins & Mortimore, 1999).

Classroom management looked at the time teachers were allocated for preparation, the scheduling and timetabling of lessons, the size of the classroom and being able to assist learners appropriately (see Section 4.4.3). Learner identification was very important – looking at who the ADHD learners are and what their needs are as well as the differentiation that needed to take place when selecting Apps and the need for appropriate selection.

The second main theme was pedagogical beliefs. This theme could be categorised into three subthemes namely perceived challenges, perceived benefits and solutions (see Section 4.5). The perceived challenges category could be separated into challenges with the time allocation of the MLT and its associated Apps in the class, difficulties with preparation time on the device, disempowerment caused by insufficient training, timetabling challenges and the perception of neglect and not being adequately supported (see Section 4.5.1).

Teacher beliefs about the pedagogical challenges of MLT and associated Apps included time constraints and limited accessibility to the application and the MLT device itself, which is linked to pedagogy, agency, autonomy and orchestrated learning (see Section 4.5.1). They felt disempowered by the lack of focused training. They also felt that they were not able to put agency and autonomy into practice which affected the pedagogy and how they used the MLT and its associated Apps to support learners with ADHD (Ertmer, 2014; Lawson, 2004; Lessing & de Witt, 2007; Mart, 2013; Martin, 2006; Swartz, 1996).

Teacher beliefs about the pedagogical benefits of MLT and associated Apps included the fact that they could see that the learners benefited from the use of the MLT and its associated Apps (see Section 4.5.2). They all stated that they could see an improvement in the concentration of the ADHD learners and that the learners were engaged and enjoyed being on the MLT and its associated Apps. ADHD learners can find learning frustrating but with MLTs, they were learning without even realising it. They also all stated that they could see the potential of MLT



but felt they were not being used to their full potential (Cota, 2008; Florian & Hegarty, 2007; Parker, 2001).

Teachers perceptions in this study showed that they believed that the provision of additional and focused training, provision of additional time to experiment with the devices and the ability to select additional applications were essential if they were to overcome some of the challenges mentioned, which linked to the teachers having agency and autonomy and being motivated by these (Hodkinson & Sparkes, 1993; Lessing & de Witt, 2007; Watkins & Mortimore, 1999). From a systemic and organisational view teachers were of the view that management of the learning and engagement time with the MLT and associated Apps needed to be rethought, particularly as current conventions of timetabling of lessons at this school was not effective in supporting the learners presenting with ADHD, which linked to pedagogy and critically evaluating MLT and its usage (Ertmer, 2014; Lawson, 2004; McNamara et al., 1997; Swartz, 1996).

Teachers perceptions of the solution to the challenges they faced with MLT and their associated Apps linked back to the teachers being able to put into place autonomy and agency (see Section 4.5.3). Beyond this point, teachers needed to be empowered through effective pedagogical knowledge and appropriate and focused training. The importance of being able to effectively prepare for a lesson was also vital for effective learning to take place (Ertmer, 2014; Hodkinson & Sparkes, 1993; Lawson, 2004; McNamara et al., 1997; Swartz, 1996; Watkins & Mortimore, 1999; Westbrook, et al., 2013).

The final main theme was defined as stimulated learning which links to the understanding that multisensory learning and fun, engaging learning needs to be in place ( see Section 2.5) (Armstrong, 2009; Landsberg, 2016; Venter, 2013). The subthemes for this theme was the perceptions of the potential of MLT and the associated Apps to support the ADHD learners (see Section 4.6.1) and the fit for purpose of MLTs and how they support the learners (see Section 4.6.2.). This meant that learners could learn at their own pace, they were more focused and that ADHD learners were engaged and enjoying the learning process (see Section 2.5) (Armstrong, 2009; Berk, 2013; Pound, 2006; Vygotsky, 1978). There was also the understanding that there was a clear improvement in learners' knowledge through the use of MLT (see Section 4.6.2 and 4.5.2).

Below the discussion of these themes and the results of this study is deepened.



### 5.2.1 Theme 1: Pedagogy

Pedagogy was identified as the main theme (see Section 4.4). In the findings, it clearly pointed to the need for an environment where pedagogical principles and processes are put in place which is key to the success of the use of MLT and its associated apps to support learners with ADHD (see Section 4.4; 4.5; 4.6). All of the above sections link to pedagogy and how it impacts on the implementation of the MLT and its associated apps.

The main aspects underpinning pedagogy is to implement appropriate training (Lessing & de Witt, 2007; Mizell, 2010) and to implement the process of orchestrated learning and classroom management (Bhowmik et al., 2013; Livingston et al., 2017; Saad et al., 2015). This is of importance to this study as we look at the perceptions of the teachers in the Foundation Phase as they implemented MLT and associated apps to support ADHD learners. Their perceptions guided this study to the understanding that it is of vital importance to have a clear process and goal in place when implementing MLT devices as a support tool for ADHD learners (see Section 4.4).

#### *Training*

The teachers in this study found that the training that was given was not applicable to the Foundation Phase. They felt the training was inadequate and felt that there was a lack of support in this regard. The teachers in this study noted that they felt neglected as a phase and that they would have preferred training that was done in a smaller group. They felt disempowered. They felt that they got lost in large group training and that the training needed to be focused and specific and not just done in general terms (see Section 4.4.1).

The above was an important finding as we see that the teacher's perception of the lack of training, in turn, made them feel they could not support the learners. They stated that the lessons became a waste because they could not do proper activities with the learners and if they did, they felt they could not guide the learners because they themselves were not guided. One of the teachers went as far as questioning whether she was doing the right things in the lessons. The lack of training left the teachers perceiving that they were not using the devices appropriately. When looking at the literature around this topic, it was clear that when teachers are not given appropriate training this will affect their teaching. This in turn affects the effectiveness of the MLT and its associated apps with the ADHD learners (IT4, L58-61IT2,

L75; IT2 L79,80; FGT5 L3; FGT9 L35-36; FGT5 L192; FGT5 L46; FGT8 L159) (Hindle, 2007; Lessing & de Witt, 2007; Mizell, 2010; Mourshed et al., 2010; Verbeek, 2014).

### *Orchestrated Learning*

Teachers perceptions in the study made it very clear that they needed the opportunity to sit with the MLT and its associated apps and work on it and appropriately select the content that they wanted to use. This was very closely linked to the teacher's autonomy and agency, which they felt was lacking. In turn this affected the way the teachers used the MLT and its associated apps with the ADHD learners (Ertmer, 2014; Hodkinson & Sparkes, 1993; Lawson, 2004; Lessing & de Witt, 2007; McNamara et al., 1997; Swartz, 1996; Watkins & Mortimore, 1999) (see Section 4.4.2).

The teachers spoke about the use of apps that seemed pointless as their learners were not struggling with that aspect. They, for example, discussed the fact that they wanted more apps focused on literacy. The Grade 1 teacher made specific reference to the use of apps that would help with decoding and phonics. This also links to providing learners with an environment that is nurturing and provides the support that is focused (IT2 L14; T4 L70; IT2 L5; IT2 L14; IT4 L5-6; IT1 L44; FGT6 L56; IT1 L22-23; IT1 L45-46; IT3 L47-48; FGT4 L50). This highlights the view that ADHD learners need to be viewed from a holistic point of view and that their support needs to be guided by an awareness of the ADHD learners' strengths and weaknesses (Armstrong, 2009; Bronfenbrenner, 1979; Decaires-Wagner & Picton, 2009) (see Section 2.2; 2.5; 2.6).

ADHD learners struggle with concentration and they need to do activities that hold their attention (APA, 2013) (see Section 2.6). Looking at the data the teacher perceptions of some of the apps were that they were boring and that the learners no longer enjoyed them. The importance of teaching in a variety of ways is evident (Armstrong, 2009) (see Section 2.5). The teachers asked for more apps so that that they could allocate specific apps to specific learners and meet their needs, highlighting the view that teachers need autonomy as they know their learners and they understand what will support their learners best (Armstrong, 2009; Berk, 2013; DoE, 2001; Ertmer, 2014; Hodkinson & Sparkes, 1993; Swartz, 1996; Vygotsky, 1978) (see sections on inclusion Section 2.2, section on development theories section 2.5, section on pedagogy, autonomy and agency Section 4.3 and 4.4).

The teachers also asked for time to do their preparations (IT3 L43; IT1 L46-47; IT1 L43; IT2 L66-68; IT3 L47; FGT5 L37-38; FGT8 L26). Preparation was highlighted as a vital component of successful teaching (Shen et al., 2007; Su et al., 2005). The teachers have the responsibility to make the curriculum accessible for all learners no matter what their barrier to learning is (DoE, 2001). Pedagogical processes need to be followed (LeRon Shults, 1999; Watkins & Mortimore, 1999). Hence, appropriate time to prepare an appropriate time to use the MLT and its associated apps needs to be allocated to the teachers (Ertmer, 2014; Hodkinson & Sparkes, 1993; Lawson, 2004; Lessing & de Witt, 2007; McNamara et al., 1997; Swartz, 1996; Watkins & Mortimore, 1999) (see Section 4.4.2).

Teachers stated that they could not use the device as a teaching tool if they only have it for 30 minutes a week during the lesson. MLT and its associated apps cannot be used as a tool if there is no planning and appropriate time with the MLT and its associated apps (IT2 L5; IT2 L14; IT4 L5-6; IT1 L44). The Grade 3 teacher stated that she could not guide her learners if she could not guide herself (IT3 L47-48; FGT4 L50), as she has never used these applications; this again links to the empowerment and motivation of the teachers being affected by the aspects of time, training, pedagogical knowledge and beliefs, agency and autonomy (Alexander, 2009; Ertmer, 2014; Hodkinson & Sparkes, 1993; Swartz, 1996).

### *Classroom Management*

The teachers in this study highlighted the need to have more time allocated to the lessons. They felt that for example, they would use the app for a writing exercise and then they would have to finish before learners are done. By the time they came back the next week the learners had forgotten what they were doing (IT1 L33; IT2 L44; FGT8L 110). This is also linked to the challenges that ADHD learners face as they struggle to maintain concentration and find academic tasks a challenge (APA, 2013) (see Section 2.6).

The teachers also spoke about the fact that with the younger learners, their perceptions of getting them logged into apps was that it took so long that they resorted to avoiding those apps all together (FGT6 L145; FGT8 L138). Teacher perception played a role in the use of MLT and its associated apps (Lee & Kim, 2015; Mogodi, 2013; Tsang & Liu, 2016) (see Section 4.5). This again highlighted the need to understand ADHD learners' strengths and weaknesses and being able to provide them with appropriate support that meets their needs (Armstrong,

2009; Bronfenbrenner, 1979; DoBE, 2014; DoE, 2001; Landsberg, 2016) (see Section 1.7.4; 1.7.5; 2.2; 2.3.1; 2.5; 2.6; 2.7).

Learners are required to build on concrete knowledge and then develop more complex knowledge (Vygotsky, 1978; Pound, 2006) (see Section 2.6). Starting to teach these learners in a zone that is not appropriate to the development stage means that effective learning will not take place (Pound, 2006; Vygotsky, 1978) (see Section 2.6).

The Grade R teacher spoke about the fact that scheduling a lesson at the end of the day is challenging as the learners are tired. Trying to do something that is too demanding does not work (IT3 L38-39). The teacher's perception was that she landed up feeling like it was a waste at stages, saying for example, that she resorted to just letting them play (see Section 4.4.5).

What was also highlighted when speaking about the issue of logging in was that the classrooms were too big, even though they are smaller (IT2 L37,38; IT3 L19). This is interesting as the idea is that independent schools have smaller classrooms and more support for the learners but using MLT and its associated apps for supporting ADHD learners requires smaller groups of learners and additional support (Nuttall, 2017). The teachers perceived it challenging to help all the learners and get all of them logged into the apps (see Section 4.5.1).

The perception of the teachers was that the senior phase teachers were provided with support which they should also have received. This perception is linked to the teacher's disempowerment as they felt that the support they were provided with was inadequate (FGT5 L46). The Grade 1 teachers spoke about the fact that they have a teacher's assistant which has made a big difference to them during these lessons (FGT6 L145; FGT8 L138). They could at least help more learners and focus on the learners that really needed assistance (FGT6 L145; FGT8 L138) (see Section 4.3; 4.4.2; 4.)

This brings to light the importance of the identification of learners who are struggling (APA, 2013; Barkley, 2006). We know that ADHD learners struggle with impulsivity and the teachers mentioned in their statements that some learners will go as far as just guessing answers because they cannot wait for the teacher to get to them (Barkley et al., 2006; Decaires-Wagner & Picton, 2009; DuPaul & White, 2006). This means that if the teachers identify the ADHD learners, they need to put plans in place when using the iPad. This is again linked to not only teacher pedagogy, agency and autonomy but teacher preparation (Alexander, 2009; Ertmer, 2014; Hodkinson & and Sparkes, 1993; Swartz, 1996; Shen et al., 2007; Su et al., 2005). Well planned

and prepared lessons create environments for effective teaching to take place (Shen et al., 2007; Su et al., 2005). One of the teachers stated it well when she said if you are going to use these devices with these learners you need to be well prepared and have a plan to make sure that you can guide them appropriately (FGT5 L46). In addition, this comes back to the concept in the *White Paper 6* of inclusion and making sure that all learners receive the support they require (DoBE, 2014; DoE, 2001) (see Section 2.2).

### **5.2.2 Theme 2: Pedagogical Beliefs**

Perceptions and beliefs are an influential aspect of teaching (Ertmer, 2014). Knowing that teachers' beliefs and perceptions can impact on their teaching is very important (Frazier, 2014; Govender, 2003; Hodkinson & Sparkes, 1993). This is echoed in previous research which states that teachers are the most influential part of a child's success at school and beyond that, their positive or negative perceptions of a learner can impact on how they teach (Govender, 2003; Lawson, 2004; Lessing & de Witt, 2007). When teachers use particular tools, their perceptions of these tools will impact on what they use effectively to support learners (Mogodi, 2013). The question in this study was what the perceptions of Foundation Phase teachers are of using MLT and their associated apps with ADHD learners. Their perceptions had a huge impact on the results (see Section 4.5).

#### *Perceived Challenges*

From the above, it is clear that the teachers faced specific challenges when using MLT and its associated apps (see Section 4.5.1). This affected its effectiveness and the way the teachers perceived this influenced how they ended up using the device as a support tool for the ADHD learners in their classes.

What was clear was that all the teachers found time a challenge, time in the lesson, and time with the devices themselves. They all stated that the lesson is about 25 min long after unpacking and packing up and making sure the next teacher has the MLT when they needed it. They all felt that this was too short to have a constructive lesson especially if the app they wanted to use required learners to login (IT4 L70; FGT6 L142; IT2 L37,38; IT3 L19) (see Section 4.4.2; 4.4.3; 4.5.1).

They wanted time on the device so that they could pick appropriate apps, but beyond that, so that they could know what was in the app and how it worked so that they could help the learners

in the class (FG L56,57). This linked very closely to their agency, autonomy and pedagogical knowledge and processes (Ertmer, 2014; Lawson, 2004; Lessing & de Witt, 2007; Mart, 2013; Martin, 2006; Swartz, 1996) (see Section 4.4.2; 4.5.1).

This perception of time had a huge impact on how teachers used the MLT in the 30 mins with many of the teachers admitting to giving up and just letting the learners play on “whatever”. This leans towards the aspect that teachers were unmotivated and disempowered which has, in turn, affected their teaching (IT3 L47-48; FGT4 L50) (Stephens, 2015) (see Section 4.3; 4.4; 4.5).

This is also relevant to the idea that there needs to be careful consideration when scheduling. Teachers teaching the MLT lesson at the end of the day noted that the learners were “finished”. The Grade R teacher said when it got to that point, she just let them play. When scheduling does not work properly, teachers are faced with the challenge of being effective at an ineffective time. This meant that this teacher’s perception was affected, as she said: *“I don’t feel it is a teaching tool at all, I can’t use it to teach”* (IT3 L47-48). The teacher’s perception of the scheduling, therefore, impact on how she used MLT and its associated apps to support ADHD learners (Ertmer, 2014; Lawson, 2004; Lessing & de Witt, 2007; Mart, 2013; Martin, 2006; Swartz, 1996) (see Section 4.4.2; 4.4.3; 4.5.1).

The teachers all commented that the school tried to provide support and training, but they all spoke about the training being inadequate for their phase. The problem here is that this perception of inadequacy went beyond just thinking training was not good enough. The teachers were disempowered and felt like they did not know what they were doing. They could not help learners because they did not understand the devices themselves (IT2 L75; IT2 L79,80; IT4 L58-61; FGT5 L3; FGT9 L35-36; FGT5 L192; FGT5 L46; FGT8 L159) (see Section 4.3; 4.4.1; 4.5.1).

The Grade 3 teacher said: *“I feel the Foundation Phase is neglected”* (FGT8 L159). It is a powerful connotation which impacts on a teacher’s ability to teach effectively (Mart, 2013; Mizell, 2010). Teachers who feel a lack of support and are disempowered cannot carry out their teaching responsibilities accurately (Martin, 2006). Beyond this, they cannot use a tool like MLT and its associated apps to support ADHD learner effectively if they are in a disempowered and unsupported space (Mogodi, 2013) (see Section 2.2; 4.4.1; 4.4.2; 4.5.1).



### *Perceived Benefits*

What is important to see throughout this process of analysing the teachers' statements is that all the teachers could see the potential in the use of MLT and its associated apps with ADHD learners (IT1 L46; IT2 L68; IT3 L26,27; FG L56,57). These are specialised professionals working in a private remedial school (see Section 2.3; 1.7.7; 1.7.8). They work daily with learners who are faced with barriers to learning and focus on ADHD learners (see Section 3.2.3). These are knowledgeable individuals (see Section 2.3). The teachers all stated many challenges and issues they were having in using MLT and its associated apps but throughout the process not one of the nine teachers said that they did not want to use it. They all answered that they were not using it to its full potential, and there was more than they could do. They wanted to use MLT and its associated apps (IT1 L46; IT2 L68; IT3 L26,27; FG L56,57). This points to the importance of teacher's beliefs being a motivating factor in effective teaching (Martin, 2006; Stephens, 2015; Tsang & Liu, 2016) (see Section 4.5.2; 4.5.3; 4.6.1; 4.6.2).

The teachers could see the benefits of using the device. *"If we have the right apps, I can see how it will benefit the learners because it is something they understand"* (FGT8 L161). This deals with the aspect of making sure that teaching is relevant and applicable (DoBE, 2018). Creating an environment that is nurturing and shifting the focus from what learners' challenges are and working with the learners' strengths (Cota, 2008; DuPaul & White, 2006; Nelson, 2007; Parker, 2001).

The teachers could see an improvement in concentration, abilities and skills when learners were using the iPads (IT1 L37; IT3 L38; IT3 L38-39). One of the teachers spoke about seeing a learner try an activity at the beginning of the year and not being able to do it but trying that same activity at the end of the year and being able to complete it (IT4 L38-40) (see Section 4.5.2; 4.6.1; 4.6.2).

Another teacher pointed to the fact that she could see the benefit of using the device because it was a multisensory device (Armstrong, 2009). The above enjoyment and sensory stimulation of learners, as well as the fact that concentration was improved, shows that stimulated learning was a positive area for MLT and its associated apps especially with ADHD learners (IT1 L40-38-37; IT2 L17, 18,28; IT1 L36). These perceptions also then directed teachers to a place of resilience. They did not just perceive MLT and its associated apps as negative, they saw something in its potential that drove them to a place of motivation and wanting to continue to



use the devices (Martin, 2006; Stephens, 2015; Tsang & Liu, 2016) (see Section 2.5; 4.5.2; 4.6.1; 4.6.2).

### *Solutions*

The above areas of perception and motivation that was created by the potential teachers could see in the devices, helped them come up with plans and ideas to improve their experience of using the devices and improving, in turn, the effectiveness of the MLT devices (FG L27,28,31,32; IT2 L69; IT1 L43,47). This links strongly to the teachers need to create environments where their autonomy and agency could flourish (Ertmer, 2014; Hodkinson & Lawson, 2004; McNamara et al., 1997; Sparkes, 1993; Swartz, 1996; Watkins & Mortimore, 1999; Westbrook, et al., 2013) and they could apply those to their pedagogy and be more effective in their support and teaching of ADHD learners (Cota, 2008; Florian & Hegarty, 2007; Parker, 2001) (see Section 2.6; 4.4; 4.5.3).

They asked for there to be more training that was specific and focused on the Foundation Phase (FGT9, L35-36). They wanted time on the devices (IT2 L14). They wanted to empower themselves and have the autonomy to decided how to use the devices effectively with their learners. They wanted the timetables looked at and to make sure that lessons are not scheduled at the end of the day. They wanted the lessons to be longer so that they could incorporate the devices into their teaching and be able to complete the activities they planned with the MLT and its associated apps (Ertmer, 2014; Hodkinson & Sparkes, 1993; Lawson, 2004; McNamara et al., 1997; Swartz, 1996; Watkins & Mortimore, 1999; Westbrook, et al., 2013). They wanted more applications so that they could differentiate and so that learners could be continuously engaged and working in their zone of proximal development (Berk, 2013; Pound, 2006; Vygotsky, 1978) (see Section 4.4; 4.5; 4.6).

### **5.2.3 Theme 3: Stimulated learning**

Part of this study was the understanding that multisensory learning and engagement and stimulated learning is important (Armstrong, 2009) (see Section 2.5). The research indicated that learners who are engaged and whose senses are stimulated learn better (Armstrong, 2009). What Gardner says is that if learners are learning in an area that is applicable to them and an area of strength for them, they learn better (Armstrong, 2009). What the MLT provided for the ADHD learners was a tool that was able to engage them in activity and hold their attention. It also stimulated their senses, as one teacher put it – as it focuses on multimedia and multisensory

(FGT8 L58) input, it was something they understood and therefore they would be able to benefit from the MLT and its associated apps (IT1 L46; IT2 L68; IT3 L26,27; FG L56,57; IT1 L37; IT3 L38; IT3 L38-39) (see Section 4.6).

### *The Potential*

There was a clear indication from all teachers in this study that the iPads have the potential to assist learners (IT4 L38-40). The one teacher said that despite all the challenges she could see the value that the iPads have for their learners (IT1 L46; IT2 L68; IT3 L26,27; FG L56,57). Knowing that something can assist learners will motivate and direct the use of the device (Tsang & Liu, 2016). Knowing that the MLT and its associated apps can benefit the learners will also motivate the teachers to continue to use the tool and to find ways to make it work (see Section 4.5.2; 4.6.1; 4.6.2).

### *Fit for Purpose*

The teachers all said that the MLT increased concentration. One of the teachers stated that they had no issues with concentration during the MLT lessons (IT1 L37; IT3 L38; IT3 L38-39). This is an important characteristic of the support tool as it has been mentioned that ADHD learners struggle with concentration (APA, 2013) (see Section 2.6). The teachers could all, as mentioned above, see that these devices could benefit the learners with one of the teachers saying that they played on the iPad at the beginning of the year and the learner could not do a specific task but by the end of the year the learner was able to achieve that task on the MLT (IT4 L38-40).

The teachers all made note of the fact that the learners were more engaged and were excited to have the iPads. They stated that most of the learners loved the opportunity to play on a device that is applicable and relevant to them (IT1 L40-38-37; IT L17,18,28; IT1 L36) (see Section 4.6.1; 4.6.2).

## **5.3 Conclusion**

In conclusion, the teachers' perception of the use of MLT and its associated apps as a support device for learners with ADHD in a private remedial school are as follows: The teachers in this study could clearly see the benefits of using MLT with ADHD learners (IT1 L37; IT3 L38; IT3 L38-39, IT1 L46, IT2 L68, IT3 L26,27; FG L56,57; FGT5 L39, 80). They could see the learners

were enthusiastic to use the devices and enjoyed working on them (IT1 L40-38-37; IT2 L17, 18,28; IT1 L36). In their opinion, they could also see that it made a difference with learners' learning skills which previously they found challenging (IT4 L38-40). When teachers see the benefit of using a tool or carrying out a task in teaching, they are motivated to continue despite any challenges (Martin, 2006; Stephens, 2015; Tsang & Liu, 2016).

They saw the MLT as multisensory and important for the support of ADHD learners (FGT8 L58). One of the teachers said that despite all the challenges she could see how MLT could benefit the learners and another teacher said that a learner can play this app and now she can see there is definite progress (IT4 L38-40). Multisensory learning is learning that is stimulating and works to assist learners in their areas of strength. When looking at ADHD learners, we understand that this form of learning can greatly assist them as it holds their attention (Armstrong, 2009; Berk, 2013; Decaires-Wagner & Picton, 2009; Vygotsky, 1978).

When implementing MLTs to support learners with ADHD in a remedial classroom, the teachers perceived many challenges. The challenges ranged from, needing time to plan and having appropriate planning in place, to needing appropriate planning and support when using MLT (IT4 L70; FGT6 L142; IT4 L51; FGT L66; IT2 L37,38; IT3 L19; IT1 L24-25; FG L48,49; FGT8 L176-181). All of the challenges that the teachers faced revolved around pedagogy, autonomy, agency, training and orchestrated learning. All of these aspects are of vital importance to effective teaching (Alexander, 2009; Bernstein, 2000; Ertmer, 2014; McNamara et al., 1997). Beyond that, how teachers perceive these aspects is what has the main impact on their teaching (Ertmer, 2014; Govender, 2003; Kern et al., & Vorster, 2015; Lessing & de Witt, 2007).

One of the teachers stated that if you are going to use MLT with ADHD learners you need to have a clear plan in place as they can be so impulsive. Teachers are a vital part of implementing MLT as support for ADHD learners. They direct the processes, support the learners during the processes and facilitate the use and content the ADHD learners have access to (FGT8 L110; FGT6 L145; FGT8 L138). This is a vital piece of information as we see that preparation time is critical to an effective supportive learning environment (Shen et al., 2007; Su et al., 2005).

The implementation challenges perceived by the teachers around app selection was an important aspect of this study as the teacher's perceptions of the apps influenced what they used, why they used it and whether they felt it was effective or not. The teachers felt that there

need to be more apps and that apps could not always be played on as a class (FGT6 L56; IT1 L45-46). One teacher said that if she could select apps then she could have one child working on an app that applies to him and another learner working on another app that is more applicable to her. The teachers identified the concept of differentiating MLT usage making sure that apps were relevant and applicable (IT2 L69; IT1 L45; IT2 L66; FGT8 L161). Teachers also wanted the autonomy to select these apps (Ertmer, 2014; Hodkinson & Sparkes, 1993; Westbrook, et al., 2013), with a few teachers saying that they wanted to download the apps, try them to see how they worked as they felt they knew their learners and knew what would help them (IT2 L66). When teachers are not given agency and autonomy, they lose confidence in their teaching and they can become frustrated and demotivated (Lessing & de Witt, 2007; Martin, 2006).

Many of the teachers pointed to the fact that there are quite a few mathematics apps and literacy apps for older learners but there are not enough apps that are focused on Foundation Phase literacy (IT1 L22-23). Teachers need to be guided on what makes a good app and how to select apps themselves (Apple Inc, 2014; Lee & Kim, 2015). They also need apps that are applicable to their learners (DoBE, 2018; Lee & Kim, 2015).

## **5.4 RECOMMENDATIONS**

### **5.4.1 Recommendations for the school**

The school should continue to use the devices but what is of vital importance from the research is that they need to put in place a better plan of action when using MLT. They need to ask themselves the questions: Why are we using the devices? What do we want to achieve by using the devices? Who are we targeting? What do we need to make this work better? What plan do we have in place to develop the use of MLT and make it more effective? Is there a review process in place? If teachers have challenges who can they go to and how do they go about that?

The school needs to strongly reconsider its training models. When teachers are saying that they feel lost in the training even though they are iPad savvy, that is a problem. The focus of training needs to be clearer: why are they doing the training, what are they trying to achieve, what do they want to see the teachers doing. The training should possibly be more focused and in smaller groups and look at specific needs. For example, today the training might be for the Foundation Phase teachers on how to use a certain app for writing a story and tomorrow might be training for the Grade 1 teachers who will learn how to use a different app for developing

bonds knowledge. Making sure that the teachers have appropriate training is important because it impacts on their effectiveness in the classroom.

Finally, the school needs to consider what their policies are regarding MLT, what their budget is for this tool and what their plan is over a certain time period. The teachers stated that the devices were implemented in 2017. This study was concluded at the end of 2018 and the teachers were still struggling with the same problems they started with. One of these is that there are not enough iPads for the teachers to prepare on. Does the school have a plan going forward on how to work towards eliminating some of the challenges the teachers are facing? If they do have a plan in place, has that appropriately been discussed with the teachers? If teachers know where they are headed and understand that their current challenges are not permanent, they will be more willing to deal with the challenges.

#### **5.4.2 Recommendations for teachers**

Teachers need to take the time to reflect on their own pedagogical principles and review their processes. They need to make sure that they are trained appropriately and if the school does not supply the training, become active in the process and find training that will empower them. Teachers should never be in a place where they feel demotivated and disempowered, they need to take an active role in changing their circumstances. They need to be aware that how they perceive things affects how effective they are as teachers.

Teachers need to become agents of change in their own systems. All the teachers in this study found the same challenges. When the focus group concluded, one of the teachers pointed out that it was nice that they could all sit and discuss their perceptions and it was encouraging to see that other colleagues were feeling the same way. If the teachers want aspects to change, they need to become champions of the cause and help bring about the change they want to see.

MLT needs champions and needs teachers to bring the issues they raised to management's attention. If management does not know what the challenges are on the ground, they cannot provide the necessary support and change that is needed.

Part of being an agent of change is not waiting for someone to help you but finding the help you need. All the teachers in this study either felt disempowered, unsupported and neglected or just badly trained. All the teachers saw MLT as beneficial, therefore try and find the training you think you need to make it work more effectively in the classroom with your learners. Once

you have gone on the training, advocate that others receive the same training. Teachers wanted autonomy when selecting apps, but none identified ways of finding apps that are appropriate; they just stated that they wanted to play on the apps and see. They need to identify what they are looking for and why; what would make it appropriate and why; what they think is an appropriate number of apps and what are some of the things they want to achieve. Asking these questions will help the teachers have a framework in place that will direct the use of apps, the selection of apps and the appropriateness of apps for their grades.

Teachers need to be aware of the knowledge they have and use that when using MLT. They are tools which can support teaching. The teachers need to lay out their own goals and planning and go as far as taking that to management. A goal might be the following: I want to use the iPad for new work every second week with the assistance of the learning support therapist because my learner's struggle and I want to find a new way to support them that uses MLT. Teachers need to trust that they know their learners and know why something would work for them and advocate for that autonomy.

### **5.4.3 Recommendations for future research**

From the above, it is clear that further research is required to expand our knowledge of what processes should be put in place before MLTs are implemented and what training should accompany that implementation. This should be expanded to include the understanding and perceptions from the viewpoint of parents, management and students.

Further research could also be done on finding apps that are specific to learning areas that ADHD learners find challenging and investigate whether an app could provide effective support to these learners and help them show improvement in that specific learning area.

This study could also be expanded to other schools; these could be remedial and private or in the government sector. For example, the Education Department has ICT policies – what are they implementing with regards to MLTs?

## **5.5 CRITICAL REFLECTION**

### **5.5.1 Strengths and limitations of the study**

The strength of this study was that the school was easily accessed because I work at the school. This also meant that the interpersonal relationships were good, which meant that the

atmosphere of the interviews was relaxed and made for an easier and more open discussion. This also meant that having followed up questions was not a challenge as the teachers were easily accessible to the researcher.

This study was limited to one specific school and therefore the potential for harm was decreased. This also meant that the data was straightforward and easy to analyse and interpret. The environment was very controlled – there were no interruptions and the data collection were rigorous speaking to the trustworthiness of this study, which was ensured by applying the following criteria: credibility, dependability, authenticity/transferability and confirming. (Creswell, 2007; Shenton, 2004).

This is novel research that focused on the use of MLT and apps with learners with ADHD. We find ourselves in the 4<sup>th</sup> industrial revolution. Technology defines our everyday lives; it has become part of the education system across the world. The Department of Education has put an ICT policy in place, but very limited research has been done in South Africa about its implementation. There has been very limited research done on the use of MLT in South African classrooms. South Africa needs to stick to global trends and see how these trends can apply and assist South African learners to better access curriculums. The private school sector has increased, with more South Africans having access to this form of education. The use of MLT in the private schools' sector has become more and more popular. The private remedial schools have also been turning to MLT to support learners with learning barriers. This research is new as it looked at the use of MLT to support ADHD learners within a remedial environment. It is important to continue this research and build on known knowledge so that we can find better ways of using MLT to support learners in South Africa.

### **5.5.2 Limitations**

The study being conducted at one school could have led to subjective views influencing the research which also links to the potential for bias to occur. This means that the researcher could neglect data that does not fit with the preferred outcomes of the research (Creswell, 2014; McMillan & Schumacher, 2014). I am a full-time staff member at the school where the research was conducted and have a good working relationship with everyone at the school. I was warned against bias and using subjective views and continuously checked with my supervisor to prevent this.



### **5.5.3 Research Bias**

I was warned against letting my own personal bias affect the research process. I was guided against neglecting certain data and just focusing on data that I preferred or demanded was relevant. I was a researcher, am a full-time staff member at the school where this study took place. I have a good relationship with other staff members at the school.

I was however aware of potential bias that could be brought about by my own personal experiences and therefore understood that the possibility of me misrepresenting the information according to these personal experiences, was a potential reality. I consulted with my research supervisor who continuously challenged me to think critically. He encouraged me to immerse myself in the data and make sure I was speaking from the data and not from my own personal perspective.

I was also aware that there was a potential for participants to be biased in their responses. Because I worked at the school and had a good relationship with them, I was aware that they may answer in a certain way because they felt that was what I wanted to hear. I consulted my supervisor, and this was why the data was cross-referenced against itself, comparing interviews and the focus group to one another, to make sure that the data was consistent and reflected the teachers' real opinions. The teachers were also not told who was in each of the groups or what they would be asked until the interviews occurred.

This study only had one form of data collection which was interviews. Interviews were selected because I was exploring the perceptions of the teachers when using an MLT with ADHD learners. This was the main aim. After consulting with my research supervisor, we decided to not just do individual interviews but use a focus group to corroborate the information we received in the individual interviews. As a researcher, to further expand on the study and to corroborate the information, I could have done observations of the MLT lessons. This became a challenge as scheduling the observations at a convenient time and getting permission from the parents to observe the lessons was logistically unrealistic.

### **5.5.4 Personal development of novice researcher**

I experienced several higher education conventions as somewhat demotivating, particularly when getting the proposal approved. I believe that future novice researchers should be supported more continuously and be part of the process when proposals are forwarded for

scrutiny, as these interactions could allow for deeper understanding and clarity during the initial processes of the emerging study. I enjoyed doing interviews and found that a focus group interview is a wonderful tool for confirming data in the interviews. I enjoyed the analysis process, coding the data looking for themes and the foundational points were fascinating. I learnt that time is vital when doing qualitative data. You need to be able to fully immerse yourself in the data and know what it says. This made writing Chapters Four and Five a lot easier. Writing parts of Chapter Four and Five also made me realise what I may have missed in terms of the literature in Chapter Two. It made me understand better how to link literature to the study. The data spoke to the literature and the literature spoke to the data, a concept I did not quite understand until I completed this process.

I enjoyed using technology to analyse the initial coding and thematic analysis. It made it easy when presented in tables and columns and spreadsheets, you could flick back and forth to. The problem I found was the final part of the analysis – the final reassembling of the data. At that point, I had to become hands on. I printed out the themes and foundational points, worked with the research questions, cut and pasted and made a mind map, which brought out the main themes and how they all spoke to one another. Again, this just reminded me how important spending time with the data was!

Despite all the challenges, I found myself in a position where I could choose to give up or continue to work hard to the end. My research has taught me more than anything how resilient I am and that even though things are difficult, no matter what I have a choice. It was either feel sorry for myself or get up and try again.

### **5.5.5 Professional development as an Educational Psychologist**

Educational Psychologists at the University of Johannesburg are trained to look at the bio-ecosystemic model as their foundational framework. This framework also then guides our interactions with the people in the systems where we work. Part of the research process was looking at the themes that the data presented us with. These themes echoed this principle – from the implementation of the MLT to support an ADHD learner, to what the perceptions were regarding the system around the teacher, as well as how the direct contact the teacher had with the MLT impacted on how they used the MLT. As an Educational Psychologist, the awareness that you need to have of the influence of surrounding systems is vital to providing learners with effective support. You cannot implement something in isolation – it does not

work. There needs to be proper training and psychoeducation so that people understand what they are using and why. There also needs to be a plan and process in place. Many schools use the SIAS and IEP process to support learners. The principles of these processes should be carried over into the development of interventions that are lasting and beneficial to all. Beyond this, I also realised the importance of being an agent of change. To see change, we must be changed; meaning we have to advocate and push for the change we want to see. A vital part of this is making sure that people are educated and trained, this includes the management of schools.

## **5.6 IN CONCLUSION**

This study showed that there is clear evidence that the teacher's perception of MLT and its associated apps did support learners with ADHD. Beyond that, they could all identify why speaking specifically to attention, engagement and multisensory learning. When we look at the fact that ADHD learners were working in their area of strength "technology" as one teacher said is something they know and understand. Scaffolding can take place and learners can learn from a place of enjoyment and engagement. (Berk, 2013; Vygotsky, 1978; Pound, 2006; Armstrong, 2009). Therefore, the ADHD learners are motivated and enjoy learning which is an area that they generally find frustrating (Armstrong, 2009; Decaires-Wagner & Picton, 2009; Parker, 2006).

This studies framework is based on the bio eco-systemic model where we need to look at learner as part of a system that continuously influences them, finding areas that are assets and using the assets rather than just looking at learners' barriers (Venter, 2013; Bronfenbrenner, 1979). The challenge is to create environments that are nurturing, positive and that build ADHD learners self-confidence (DuPaul & White, 2006; Cota, 2008; Decaires-Wagner & Picton, 2009).

As stated earlier, we are entering the era of the Fourth Industrial Revolution and if the aim of education is to fully develop untapped potential of learners and to equip them with the necessary skills, knowledge and attitudes to not only 'survive' but to 'thrive' in the world that they will be living in, then we need to immerse them as much as possible and as early as possible in the world of digital technology. With a particular focus on this study, making learners aware of the power of MLT and associated apps to assist them with their own learning

challenges, maybe a life-long learning goal for learners presenting with specific learning difficulties which still lie dormant in research agendas.

## References

- Ahmad, F. K. (2015). Use of Assistive Technology in Inclusive Education. *Transcience*, 6(2), 62-77.
- Alexander, R. (2009). Pedagogy, culture and the power of comparison. In H. Daniels, H. Lauder, & J. Porter, *Educational theories, cultures and learning: A critical perspective*. (pp. 10-26). London: Routledge.
- Ally, M., & Prieto-Blázquez, J. (2014). What is the future of mobile learning in education. *Revista de Universidad y Sociedad del Conocimiento*, 11(1), 142-151.
- Alsaadat, K. (2017). Mobile Learning Technologies. *International Journal of Electrical and Computer Engineering*, 7(5), 2833- 2837.
- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition: DSM-5*. Washington, DC: American Psychiatric Association.
- Apple Inc. (2014 ). *iPad in Education: Evaluating Apps for the Classroom*. U.S.: Apple Inc.
- Armstrong, T. (2009). *Multiple intelligences in the classroom*. Alexandria, Va: Association for Supervision and Curriculum Development.
- Barkley, R. A. (2006). *Attention-deficit hyperactivity disorder* (3 ed.). New York: Guilford Press.
- Barkley, R. A., Mash, E. J., & Wells, K. C. (2006). *Treatment of Childhood Disorders*. New York: Guilford Publications.
- Beauchaine, T. P., & Hinshaw, S. P. (2013). *Child and Adolescent Psychopathology*. Somerset: John Wiley & Sons, Incorporated.
- BECTA. (2003). *Annual report 2003–04* . United Kingdom: BECTA.
- Berk, L. E. (2013). *Child development*. New Jersey: Pearson.

- Bernstein, B. (2000). *Pedagogy, symbolic control and identity*. Lanham: MD: Rowman and Littlefield.
- Bronfenbrenner, U. (1979). *The Ecology of Human Development*. . Cambridge: MA: Harvard University Press.
- Bruner, J. S. (1957). *Going beyond the information given*. New York: Norton.
- Cherrington, A. (2017). Positioning a Practice of Hope in South African Teacher Education Programmes. *Educational Research for Social Change (ERSC)*, 6(1), 72-86.
- Conway, C. (2017). *Teachers' Perspectives of Learner Support in a Full-service school- case study*. Stellenbosch: Stellenbosch University.
- Cota, J. J. (2008). *Academic challenges for children with ADHD: policy implications for school-based practice*. The University of Vermont, The Faculty of the Graduate College. Vermont: The University of Vermont.
- Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches*. California: Sage Publications, Inc.
- Creswell, J. W. (2014). *Research design : qualitative, quantitative, and mixed methods approaches*. United States of America: SAGE Publications, Inc.
- Cumming, T. M., & Rodríguez, C. D. (2017). A Meta-Analysis of Mobile Technology Supporting Individuals With Disabilities. *The Journal of Special Education*, 1-13.
- Daly, B. P., Hildenbrand, A., & Brown, R. T. (2015). *Attention-deficit/hyperactivity disorder in children and adolescents*. Boston USA: Hogrefe publishing . Retrieved from [www.intechopen.com](http://www.intechopen.com).
- de Vos, A., Strydom, H., Fouché, C., & Delpont, C. (2011). *Research at grass roots*. Pretoria: Van Schaik Publishers.
- Decaires-Wagner, A., & Picton, H. (2009). *Teaching And ADHD in southern African Classroom*. Northlands: Macmillan South Africa (pty) Ltd.

- Department of Basic Education. (2014). *Draft policy on screening, identification, assessment and support* . Pretoria: Department of Basic Education.
- Department of Basic Education. (2016). *Education Statistics in South Africa 2016*. Pretoria: Department of Basic Education.
- Department of Basic Education. (2018). *Draft National Guidelines for Resourcing an Inclusive Education System*. Pretoria: Department of Basic Education.
- Department of Education. (2001). *Education white paper 6: Special Needs Education Building an inclusive education and training system*. Pretoria: Department of Education.
- Department of Education. (2003). *Revised National Curriculum Statement Grades R-9 (Schools)*. Pretoria: Department of Education.
- Dias, L., & Victor, A. (2017). Teaching and Learning with Mobile Devices in the 21st Century Digital World: Benefits and Challenges . *European Journal of Multidisciplinary Studies*, 340-345.
- DuPaul, G., & White, G. (2006). ADHD: Behavioural, educational, and medication interventions. *The Education Digest* , 71, 57–60.
- Elphick, J. (2015). *Study on Children with Disabilities from Birth to Four Years*. Department of Basic Education and UNICEF South Africa. Pretoria: Unicef South Africa.
- Environmental Protection Agency's. (2013). *America's Children and the Environment*. United States of America: U.S. Environmental Protection Agency's America's Children.
- Erikson, E. H. (1968). *Identity: Youth and crisis*. New York: W. W. Norton.
- Ertmer, P. A. (2014). *Teacher Pedagogical Beliefs and Classroom Technology Use: A Critical Link*. West Lafayette: Purdue University.
- Fleming, J. S. (2018, 12 14). *Erikson's Psychosocial Developmental Stages*. Retrieved from swppr.org. : <http://swppr.org/textbook/ch%209%20erikson.pdf>
- Florian, L., & Hegarty, J. (2007). *ICT and Special Educational Needs*. Berkshire: McGraw-Hill Education.

- Frazier, D. K. (2014). *Changing course: mid-western primary-grade teachers' perception and use of ipads for classroom instruction*. Ball State University , Philosophy in Education. Indiana: Ball State University .
- Govender, P. (2003). *Teachers' perceptions of children with Attention Deficit Hyperactivity Disorder and the effects of Ritalin*. University of Zululand, Educational Psychology. Zululand: University of Zululand.
- Hasselbring, T. S., & Glaser, C. H. (2000). Use of Computer Technology to Help Students with special needs. *The Future of Children and computer technology* , 102-122.
- Hill, P., & Rowe, K. (1996). Multilevel modeling in school effectiveness research. *School Effectiveness and School Improvement*, 7, 1-34.
- Hindle, D. (2007). *Guidelines for Teacher Training and Professional Development in ict*. Gauteng: SchoolNet SA .
- Hoadley, U. (2010). *What do we know about teaching and learning in primary schools in South Africa? A review of the classroom-based research literature*. Stellenbosch: University of Stellenbosch.
- Hodkinson, P., & Sparkes, A. (1993). Prevocationalism and empowerment; some questions for PE. In M. Keynes, *Skills and Vocationalism: the easy answer*,. London: Open University.
- Honkasilta, J. (2016). *Voices behind and beyond the label: the master narrative of ADHD (de)constructed by diagnosed children and their parents*. Jyväskylä: University of Jyväskylä.
- Hovie, D. T. (2012, November 29). *Reading comprehension deficits in students with ADHD: causes and intervention strategies*. Northern Michigan Universtiy, EDUCATION. Michigan: Northern Michigan Universtiy.
- Japari School . (2018, March 29). *Japari School* . Retrieved from Remedial Education: <https://webcache.googleusercontent.com/search?q=cache:B-MrbiiAiZsJ:https://japari.co.za/remedial-education/+&cd=1&hl=en&ct=clnk&gl=za>



- Japari School. (2017, July 31). *Japari School*. Retrieved from What makes a great remedial school: <https://webcache.googleusercontent.com/search?q=cache:-cqso9MwWwIJ:https://japari.co.za/great-remedial-school/+&cd=1&hl=en&ct=clnk&gl=za>
- Japari School. (2019, march 1). *Japari School*. Retrieved from How Independent Schools are Helping Remedial Students to Win: <https://webcache.googleusercontent.com/search?q=cache:mjHETiL57YUJ:https://japari.co.za/independent-schools-helping-students/+&cd=1&hl=en&ct=clnk&gl=za>
- Johnston, C., & Park, J. L. (2015). Interventions for Attention-Deficit Hyperactivity Disorder: A Year in Review. *Current Developmental Disorders Reports*, 2(1), 38–45.
- Kern, A., Amod, Z., Seabi, J., & Vorster, A. (2015). South African Foundation Phase Teachers' Perceptions of ADHD at Private and Public Schools. *International Journal of Environmental Research and Public Health*, 3042-3059.
- Landsberg, E. (Ed.). (2016). *Addressing barriers to learning: a South African perspective*. Pretoria: Van Schaik.
- Lawson, T. (2004). Teacher autonomy: Power or control? *Education*, 3-13.
- le Roux, B. (2016). SIAS Implementation. *South African Teachers' Union* (pp. 1-69). South African Teachers' Union.
- Lee, J.-S., & Kim, S.-W. (2015). Validation of a Tool Evaluating Educational Apps for Smart Education. *Journal of Educational Computing Research*, 435–450.
- Lenartowicz, A., & Loo, S. K. (2014). Use of EEG to Diagnose ADHD. *Curr Psychiatry Rep*, 16(498), 2-11.
- Lessing, A., & de Witt, M. (2007). The value of continuous professional development: teachers' perceptions. *South African Journal of Education*, 27(1), 53–67.
- Livingston, K., Schweisfurth, M., Brace, G., & Nash, M. (2017). *Why Pedagogy Matters: The role of pedagogy in Education 2030*. Glasgow: General Teaching Council for Wales.

- Lucangeli, D., & Cabrele, S. (2006). Mathematical Difficulties and ADHD. *Externality* , 53–62.
- Ludlow, B. L. (2001). Technology and Teacher Education in Special Education: Disaster or Deliverance? *Teacher Education and Special Education*, 143-163.
- Maguire, M., & Delahunt, B. (2017). Doing a Thematic Analysis: A Practical, Step-by-Step Guide for Learning and Teaching Scholars. *Teaching and Learning in Higher Education*, 3, 3352-33513. Retrieved from <http://ojs.aishe.org/index.php/aishe-j/article/view/335>
- Mahlo, F. (2011). *Experiences of learning support teachers in the foundation phase, with reference to the implementation of inclusive education in Gauteng*. University of South Africa, Inclusive education . Pretoria: University of South Africa.
- Mart, Ç. (2013). A Passionate Teacher: Teacher Commitment and Dedication to Student Learning. *International Journal of Academic Research in Progressive Education and Development*, 2(1), 437-442.
- Martin, A. (2006). The relationship between teachers' perceptions of student motivation and engagement and teachers' enjoyment of and confidence in teaching. *Asia-Pacific Journal of Teacher Education*, 34(1), 73-93.
- McGrath, L. M., Pennington, B. F., Shanahan, M. A., Santerre-Lemmon, L. E., Barnard, H. D., Willcutt, E. G., . . . Olson, R. K. (2011). A multiple deficit model of reading disability and attention-deficit/hyperactivity disorder: searching for shared cognitive deficits. *Journal of Child Psychology and Psychiatry*, 52(5), 547-557.
- McMillan, J., & Schumacher, S. (2014). *Research in Education Evidence-Based Inquiry*. Edinburgh: Pearson Education Limited.
- McNamara, G., O'Hara, J., & and Rousi, H. (1997). The Pedagogical Challenges of Constructivist Theory and Empowerment in Learning and Information Technology. *Irish Educational Studies*, 17, 17-38.
- Merriam-Webster, I. (2018, September 15). <https://www.merriam-webster.com>. Retrieved from <https://www.merriam-webster.com>: <https://www.merriam-webster.com>

- Mizell, H. (2010). *Why professional development matters*. Oxford: Learning Forward.
- Mogodi, T. K. (2013). *The use of ICT for learning at a Dinaledi school in Limpopo*. University of Johannesburg, Education. Johannesburg: University of Johannesburg.
- Motitswe, J. M. (2012). *Teaching and learning methods in inclusive classrooms in the foundation phase*. University of South Africa , Inclusive Education . Pretoria: University of South Africa .
- Mourshed, M., Chijioke, C., & Barber, M. (2010). *How the world's most improved school systems keep getting better*. London: McKinsey & Company.
- NAPTOSA. (2018). Screening, Identification, Assessment and Support (SIAS). *Gauteng School Leaders' NAPTOSA Conference* (pp. 1-15). Gauteng: NAPTOSA.
- Nel, R. (2014). *Classroom management of Attention-Deficit-Hyperactivity Disorder (ADHD) in learners in the Foundation Phase in the Lejweleputswa*. Bloemfontein: Central University of Technology.
- Nelson, A. L. (2007). *Teacher Use of Interventions for Students With Attention Deficit Hyperactivity Disorders and Reading Disabilities*. Emporia State University, Department of Psychology and Special Education. United States: Emporia State University.
- Nuttall, T. (2017). The opportunities and challenges facing independent schools - South Africa 2017: a view from St Stithians College. *Gauteng Department of Education Consultative: Summit with Independent Schools* (pp. 1-30). Johannesburg: St Stithians College.
- Oelofsen, R. (2015). Decolonisation of the African mind and intellectual landscape. *Phronimon*, 16(2), 130–146.
- Olusakin, A. M., Osarenren, N., & Obi, F. (2008). Towards Helping Children with Attention Deficit Hyperactivity Disorder (ADHD) to Enjoy Peaceful Schooling. *Student Home Communication Science*, 2(1), 19-32.

- Parker, H. .. (2006). *Problem Solver Guide for Students with ADHD : Ready-to-Use Interventions for Elementary and Secondary Students*. Plantation: Specialty Press/A.D.D. Warehouse.
- Pavlidis, G. T., & Giannouli, V. (2014). 15 Linking ADHD – Dyslexia and Specific Learning Difficulties. In E. Julian, & K. a. James, *The SAGE Handbook of Emotional and Behavioral Difficulties* (p. 221). 55 City Road: SAGE Publications Ltd.
- Piaget, J. (1977). *Psychology and Epistemology: Towards a Theory of Knowledge*. Virginia: Penguin Books.
- Pound, L. (2006). *How children learn*. London: Practical Pre-School Books, A Division of MA Education Ltd.
- Productions, S. (2018 , September 15). <https://techterms.com>. Retrieved from techterms.com: <https://techterms.com/>
- Raggi, V. L., & Chronis, A. M. (2006). Interventions to Address the Academic Impairment of Children and Adolescents with ADHD. *Clinical child and family psychology review*, 85-111.
- Regan, K., Berkeley, S., Hughes, M., & Kirby, S. (2014). Effects of Computer-Assisted Instruction for Struggling Elementary Readers With Disabilities. *The Journal of Special Education*, 106–119.
- Republic of South Africa. (2004). *Draft white paper on e education*. Pretoria: Department of Education.
- Republic of South Africa. (2007). *Government Gazette: National Education Policy Act (27/1996): The National Policy Framework for Teacher Education and Development in South Africa*. Department of Education . Pretoria: Republic of South Africa.
- Rief, S. F. (2016). *Practical Techniques, Strategies, and Interventions: How to reach & teach children & teens with ADD/ ADHD* (3rd ed.). San Francisco: Jossey-Bass A Wiley Brand.
- Saad, J. F., Kohn, M., Clarke, S., Lagopoulos, J., & Hermens, D. F. (2015). Is the Theta/Beta EEG Marker for ADHD Inherently Flawed? *Journal of Attention Disorders*, 1–12.

- Safaan, N. A., El-Nagar, S., & Saleh, A. G. (2017). Teachers' Knowledge about Attention Deficit Hyperactivity Disorder among Primary School Children. *American Journal of Nursing Research*, 42-52.
- Saunders, M., Lewis, P., & Thornhill, A. (2015). *Research Methods for Business Students*. London: Pearson Education Limited.
- Schutte, S. (2018, October and November 1). Over to you . *Child Magazine*, p. 6.
- Schwab, K. (2016). *The Fourth Industrial Revolution*. New York: Crown Business.
- Scott, D., & Morrison, M. (2005). *Key Ideas in Educational Research*. London: Continuum International Publishing Group.
- Sejanane, C. (2014). *The perceptions and experiences of School Management Teams (SMTs) on teamwork*. Pretoria : UNISA.
- Serero, P. J. (2010). *The use of information communication technology in supporting learners with visual impairments in special schools*. North-West University, Educational Psychology. Vanderbijlpark: North-West University.
- Sharma, H. K. (2015). Role of ICT in Improving the Excellence of Education. *International Journal on Computer Science and Engineering*, 78-81.
- Shen, J., Poppink, S., Cui, Y., & Fan, G. (2007). *Lesson Planning: A Practice of Professional Responsibility and Development*. Educational Horizons.
- Shuler, C. (2012). *iLearn An Analysis of the Education Category of Apple's App Store*. New York: The Joan Ganz Cooney Center at Sesame Workshop.
- Sikotane, G. (2016). *Experiences of educators teaching learners with attention deficit hyperactivity disorder in Umtunzini circuit*. South Africa: University of Zululand.
- Slee, R. (2014). Evolving theories of student disengagement: a new job for Durkheim's children? . *Oxford Review of Education*, 40(4), 446–465.
- Statistics South Africa. (2016). *Education Series Volume III: Educational Enrolment and Achievement Report No. 92-01-03*. Pretoria: Statistics South Africa.

- Stephens, T. L. (2015, August 21). *Encouraging Positive Student Engagement and Motivation: Tips for Teachers*. Retrieved from pearson: <https://www.pearsoned.com/encouraging-positive-student-engagement-and-motivation-tips-for-teachers/>
- Su, Z., Qin, H., & Huang., T. (2005). The Isolated Teacher: What We Can Learn from the Chinese. *Wingspread Journal*, 7–13.
- Swartz, E. (1996). Emancipatory pedagogy: a postcritical response to 'standard' school knowledge. *Journal of Curriculum Studies*, 28(4), 397-418.
- Taylor, E. (2011). Commentary: Reading and attention problems – how are they connected? Reflections on reading McGrath et al. (2011). *Journal of Child Psychology and Psychiatry*, 558-559.
- The Understood Team. (2019). *www.understood.org*. Retrieved 6 28, 2019, from Remedial Programs: What You Need to Know: <https://www.understood.org/en/learning-attention-issues/treatments-approaches/educational-strategies/remedial-programs-what-you-need-to-know>
- Tillman, P. S. (2003, Aug 20). *Computer-Assisted Instruction (CAI) and Reading Acquisition*. Retrieved from <http://citeseerx.ist.psu.edu/index:> <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.513.6690&rep=rep1&type=pdf>
- Tooke, J. (2018, October and November 1). Tech Toys-combining fun with function . *Child Magazine*, pp. 20-21.
- Topkin, B., Roman, N. V., & Mwaba, K. (2015, May). Attention Deficit Disorder (ADHD): Primary school teachers' knowledge of symptoms,treatment and managing classroom behaviour. *South African Journal of Education*, 35(2), 1-8.
- Tree, T. M. (2008). *School-Based Services for Children with AttentionDeficit/Hyperactivity Disorder*. Utah State University, Psychology . Utah: Utah State University.
- Tsang, K. K., & Liu, D. (2016). Teacher Demoralization, Disempowerment and School Administration. *Qualitative Research in Education*, 5(2), 200-225.

- UNESCO. (2005). *Information and communication technologies in schools a handbook for teachers*. France: UNESCO.
- UNESCO Institute. (2006). *ICTs in education for people with special needs*. Moscow: UNESCO Institute.
- UNICEF. (2015). *Assistive Technology for Children with Disabilities: Creating Opportunities for Education, Inclusion and Participation A discussion paper*. Switzerland: UNICEF.
- UNISA. (2018). *Inclusive Education: ETH302*. Retrieved from [gimmenotes.co.za: https://gimmenotes.co.za/wp-content/uploads/2018/12/501\\_2016\\_3\\_e.pdf](https://gimmenotes.co.za/wp-content/uploads/2018/12/501_2016_3_e.pdf)
- Van Der Berg, S., Van Wyk, C., Burger, R., & kotzé, j. (2017). *The performance of low fee independent schools in south africa – what can available data tell?* Cape Town: University of Stellenbosh.
- Vargo, F. E. (2015). *Neurodevelopmental Disorders: A Definitive Guide for Educators*. New York: W. W. Norton & Company.
- Venter, M. (2013). *A teacher's experience of implementing the asset-based approach to teach Grade 7 learners*. University of Pretoria, Department of Educational Psychology. Pretoria: University of Pretoria.
- Verbeek, C. (2014). Critical reflections on the PGCE (Foundation Phase) qualification in South Africa. *South African Journal of Childhood Education*, 3(4), 37-51.
- Vygotsky, L. (1978). Interaction Between Learning and Development. In M. Cole, & M. Gauvain, *Readings on the Development of Children*. (pp. 34-40.). New York: Scientific American Books.
- Watkins, C., & Mortimore, P. (1999). Pedagogy: What do we know? In M. P, *Understanding pedagogy and its impact on learning* (pp. 1-19). London: Paul Chapman Publishing.
- Wearmouth, J. (2008). *Beginning Teacher's Guide to Special Educational Needs*. Berkshire: McGraw-Hill Education.
- Weeks, F. H. (2003). *Only study guide for ETH306-W special educational needs*. Pretoria Muckleneuk: University of South Africa.



- Wentzel, D. v. (2016). *Primary school teachers' experiences of providing learning support for learners with mild intellectual disabilities*. University of South Africa, Inclusive education . Pretoria: University of South Africa.
- Westbrook, J., Durrani, N., Brown, R., Orr, D., Pryor, J., Boddy, J., & Salvi, F. (2013). *Pedagogy, Curriculum, Teaching Practices and Teacher Education in Developing Countries. Final Report*. Sussex: Education Rigorous Literature Review and Department for International Development.
- William and Mary Training & Technical Assistance Center. (2017). Classroom Interventions for Attention Deficit/Hyperactivity Disorder Considerations Packet. *Classroom Interventions for Attention Deficit/Hyperactivity Disorder* (pp. 1-11). Williamsburg: William and Mary Training & Technical Assistance Center.
- Wits School of Governance. (2016). *Teachers, parents and school leaders working together to improve learners' education deep dive executive summary*. Johannesburg : Wits School of Governance.
- Wolf, M. (2006). *RAVE-O Manual: A systematic approach t fluency and comprehension* . Tuft: Tuft University .
- Xie, J., Basham, J. D., Marino, M. T., & Rice, M. F. (2018). Reviewing Research on Mobile Learning in K–12 Educational Settings: Implications for Students With Disabilities. *Journal of Special Education Technology*, 27-39.
- Yin, R. K. (2011). *Qualitative Research from Start to Finish*. New York: The Guilford Press.
- Youssef, M. K., Hutchinson, G., & Youssef, F. F. (2015). Knowledge of and Attitudes Toward ADHD Among Teachers. *SAGE Open*, 5(1), 2158244014566761.
- Zaporozhets, A. (2002). The Role of L.S. Vygotsky in the Development of Problems of Perception. *Journal of Russian and East European Psychology*, 3–17.



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## APPENDICES

### APPENDIX A: EDITOR LETTER

*Nikki Watkins*  
*Editing/proofreading services*

#### **To whom it may concern**

This letter serves to inform you that I have done language editing,  
proofreading and formatting on the thesis

**FOUNDATION PHASE TEACHERS' PERCEPTIONS OF USING MOBILE  
LEARNING TECHNOLOGY TO ASSIST LEARNERS WITH ADHD IN A PRIVATE  
REMEDIAL SCHOOL**

UNIVERSITY  
JOHANNESBURG

by **DENISE NORTHCOTT**



Nikki Watkins

24/01/2019

## APPENDIX B: ETHICAL CLEARANCE

NHREC Registration Number REC-110613-036



### ETHICS CLEARANCE

Dear Denise Northcott

**Ethical Clearance Number: Sem 2 2018-021**

**FOUNDATION PHASE TEACHERS' PERCEPTIONS OF USING MOBILE LEARNING TECHNOLOGY TO ASSIST LEARNERS WITH ATTENTION DEFICIT HYPERACTIVITY-DISORDER IN A PRIVATE REMEDIAL SCHOOL**

Ethical clearance for this study is granted subject to the following conditions:

- If there are major revisions to the research proposal based on recommendations from the Faculty Higher Degrees Committee, a new application for ethical clearance must be submitted.
- If the research question changes significantly so as to alter the nature of the study, it remains the duty of the student to submit a new application.
- It remains the student's responsibility to ensure that all ethical forms and documents related to the research are kept in a safe and secure facility and are available on demand.
- Please quote the reference number above in all future communications and documents.

**The Faculty of Education Research Ethics Committee has decided to**

- Grant ethical clearance for the proposed research.
- Provisionally grant ethical clearance for the proposed research
- Recommend revision and resubmission of the ethical clearance documents

Sincerely,

Dr David Robinson

**Chair: FACULTY OF EDUCATION RESEARCH ETHICS COMMITTEE**

21 January 2019

# NDA Agreement

This Confidentiality Agreement is made on 17 August 2018

## **BETWEEN:**

- (1) **Denise Northcott**, an individual in South Africa with ID number 8705260008087, whose principal place of residence is at 929 Vale road, Weltevreden Park; and
- (2) **EDITA SERVICES (PTY) Limited**, a company registered in South Africa with registered number 2014/235262/07, whose principal place of business is at 197 Smit Street, Fairland, Johannesburg, 2195.

## **(3) BACKGROUND**

- (A) Each of the parties has agreed to disclose to the other certain confidential information relating to its business for the purpose of enabling the parties to consider whether or not they wish to enter into a proposed contractual arrangement (the "**Purpose**").
- (B) All such confidential information shall be disclosed and received subject to the terms and conditions of this Agreement.

## **THE PARTIES NOW AGREE AS FOLLOWS:**

1. For the purposes of this Agreement, a party's "**Confidential Information**" shall mean all information of whatever nature and in whatever form, format or medium, relating to that party and/or its associated companies, whether or not such information is marked as being confidential or proprietary, and shall include without limitation information relating to that party's and/or such associated companies' existing or potential clients, customers, employees, officers, inventions, products, designs, research and development, production, manufacturing and engineering processes, price lists or pricing structures, marketing and sales information, business plans or dealings and/or finances, together with the results of, and all notes relating to, any evaluation of such Confidential Information made by or on behalf of the other party.
2. Each party acknowledges and agrees that all Confidential Information disclosed to it by the other party is confidential and proprietary to the other party and that it is bound by a strict duty of confidence in relation to the same.
3. A party's Confidential Information shall not include information which:
  - (a) at the time of receipt by the other party is in the public domain;
  - (b) subsequently comes into the public domain through no fault of the other party, its officers, employees or agents;
  - (c) the other party can prove was already in its possession at the time of disclosure by the disclosing party and was not obtained directly or indirectly from the disclosing party; or
  - (d) the other party can prove has been lawfully received by it from a third party on an unrestricted basis without breach of this Agreement.

- (e) Was independently developed directly or indirectly by the receiving Party without the use of the disclosing party's Confidential Information.
4. In consideration of the other party agreeing to disclose its Confidential Information hereunder, each party undertakes that it shall:
- (a) ensure that the other party's Confidential Information remains confidential at all times and is kept secure and protected against theft, damage, loss or unauthorised access;
  - (b) not at any time use, disclose, exploit, copy or modify any of the other party's Confidential Information other than as necessary in connection with the Purpose;
  - (c) keep the other party's Confidential Information physically separate from its own information (and any third party's information held by it);
  - (d) not use, reproduce, translate or store any of the other party's Confidential Information in any externally accessible computer or electronic information system;
  - (e) not remove any proprietary notices of the other party, its clients, customers or suppliers embodied in the other party's Confidential Information;
  - (f) not disclose to any person, without the other party's prior written consent, (i) the fact that the other party's Confidential Information has been made available to it or that it has inspected all or any part of the other party's Confidential Information, (ii) the fact that any discussions or negotiations are taking or have taken place concerning the proposed contractual arrangement between the parties, or (iii) any of the terms or conditions of, or any other information relating to, such contractual arrangement; and
  - (g) not make any contact with any of the other party's directors, officers, employees, advisers, customers, suppliers or sub-contractors other than those persons notified in writing to it by the other party.
5. Each party may disclose the other party's Confidential Information only to those of its officers, employees and its professional advisers who reasonably need access to the same for the Purpose, and only on the basis that it ensures that such officers, employees and professional advisers are made aware of and agree to comply with the confidentiality obligations set out in this Agreement.
6. This Agreement shall not be deemed to grant either party any licence or rights with respect to the other party's Confidential Information other than as expressly set out in this Agreement, nor shall it create any obligation on the part of either party to disclose any of its Confidential Information to the other party. Each party understands and acknowledges that the other makes no representation or warranty and accepts no liability in respect of the accuracy, completeness or usefulness of any of its Confidential Information.
7. Upon the earlier of a written request from, or the conclusion of any discussions, meetings and/or contractual negotiations with the other party, each party shall, in accordance with the other party's instructions, return to the other party or destroy all of the other party's



Confidential Information then in its possession or control and shall not retain any copies of the same.

8. Each party shall immediately upon becoming aware of the same give notice to the other party of any unauthorised disclosure, misuse, theft or other loss of the other party's Confidential Information, whether inadvertent or otherwise.
9. The use and/or disclosure by either party of the other party's Confidential Information shall not be a breach of this Agreement if and to the extent that such disclosure is required by law, regulation or order of a competent authority, provided that the other party is given reasonable advance notice of the intended disclosure and a reasonable opportunity to challenge the same.
10. This Agreement, and the confidentiality obligations contained herein, shall continue for 2 years from the date hereof.
11. Each party shall be liable for and shall indemnify the other party against any and all claims, actions, liabilities, losses, damages or expenses (including legal expenses) incurred by the other party which arise out of or in connection with, directly or indirectly, any breach of this Agreement by it, its officers, employees or professional advisers, including without limitation any losses or expenses arising out of any third party demand, claim or action (including any claim alleging infringement of third party rights).
12. Each party acknowledges and agrees that a breach by it of this Agreement may result in irreparable and continuing damage to the other party for which there may be no adequate remedy at law, and that in the event of any actual or threatened breach, the other party shall be entitled to apply for injunctive relief and such other and further relief as may be appropriate.
13. The failure of either party to enforce or exercise at any time or for any period of time any term of or any right pursuant to this Agreement does not constitute, and shall not be construed as, a waiver of such term or right and shall in no way affect that party's right later to enforce or to exercise it.
14. If any term of this Agreement is found to be illegal, invalid or unenforceable under any applicable law, such term shall, insofar as it is severable from the remaining terms, be deemed omitted from this Agreement and shall in no way affect the legality, validity or enforceability of the remaining terms.
15. Any valid alteration to or variation of this Agreement must be in writing and signed on behalf of each of the parties by a duly authorised officer.
16. This Agreement is governed by the laws of the Republic of South Africa and each party submits to the exclusive jurisdiction of the South African courts to resolve any dispute arising hereunder.



- (e) Was independently developed directly or indirectly by the receiving Party without the use of the disclosing party's Confidential Information.
4. In consideration of the other party agreeing to disclose its Confidential Information hereunder, each party undertakes that it shall:
- (a) ensure that the other party's Confidential Information remains confidential at all times and is kept secure and protected against theft, damage, loss or unauthorised access;
  - (b) not at any time use, disclose, exploit, copy or modify any of the other party's Confidential Information other than as necessary in connection with the Purpose;
  - (c) keep the other party's Confidential Information physically separate from its own information (and any third party's information held by it);
  - (d) not use, reproduce, translate or store any of the other party's Confidential Information in any externally accessible computer or electronic information system;
  - (e) not remove any proprietary notices of the other party, its clients, customers or suppliers embodied in the other party's Confidential Information;
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5. Each party may disclose the other party's Confidential Information only to those of its officers, employees and its professional advisers who reasonably need access to the same for the Purpose, and only on the basis that it ensures that such officers, employees and professional advisers are made aware of and agree to comply with the confidentiality obligations set out in this Agreement.
6. This Agreement shall not be deemed to grant either party any licence or rights with respect to the other party's Confidential Information other than as expressly set out in this Agreement, nor shall it create any obligation on the part of either party to disclose any of its Confidential Information to the other party. Each party understands and acknowledges that the other makes no representation or warranty and accepts no liability in respect of the accuracy, completeness or usefulness of any of its Confidential Information.
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This Agreement has been entered into on the date stated at the beginning of it.

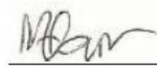
**SIGNED** by a duly authorised )

signatory for and on behalf of )  
Denise Northcott )



**SIGNED** by a duly authorised )

signatory for and on behalf of )  
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## APPENDIX C: LETTERS OF CONSENT

### DEAR Principal

As part of my Master's Degree in Educational Psychology at the University of Johannesburg, I am required to complete a research by way of a minor dissertation.

While employed at Crossroads school, I have noted that staff have recently implemented the use of IPADS in the foundation phase.

I am interested in exploring how the teachers use the IPADS and particularly certain Apps in the Foundation phase. The main aim of the study is to attempt to gain an understanding of teacher's views on the use of such Apps in their classrooms.

- In collecting information to answer this question I intend to: Select Foundation phase teachers who would voluntarily participate in the research.
- observe the selected and willing teachers during their IPAD lessons and the use of the Apps in the lesson
- interview each of these teachers regarding their experiences of the use of the IPAD and Apps, with reference to my observations in their classes
- conduct a focus group discussion with the remaining Foundation phase teachers, with their consent, where we will discuss their experiences of the use of the IPADS and the Apps they are using in the classroom
- As I will be entering classrooms where learners are present, I will also request Informed Consent form the parents of the learners in Foundation phase classrooms where teachers have volunteered to be observed
- request all learners to Assent to me observing the teacher in the classroom before the observations are undertaken.

The school's name will not be mentioned in the study and participants will be provided with Pseudonyms to maintain confidentiality. I will also member-check the interviews after recording with the participants. I will ensure that the data collection process does not interfere with valuable teaching time or therapy sessions. All information acquired, analyses done as well as a copy of the final report will be made available after completion of the study.

I hereby formally request consent to complete my study at the school with the participants as mentioned. Please do not hesitate to contact me or my research supervisor if you have any further questions.

Kind regards

---

Denise Northcott

[denisenorthcott@gmail.com](mailto:denisenorthcott@gmail.com)

Masters Student

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Dr MP Van der Merwe

[martynvdm@uj.ac.za](mailto:martynvdm@uj.ac.za)

Research Supervisor



## DEAR FOUNDATION PHASE STAFF

As part of my Master's Degree in Educational Psychology at the University of Johannesburg, I am required to complete a minor research dissertation.

While employed at Crossroads school, I have noted that staff have recently implemented the use of IPADS in the foundation phase.

I am interested in exploring how the teachers use the IPADS and particularly certain Apps in the Foundation phase. The main aim of the study is to attempt to gain an understanding of teacher's views on the use of such Apps in their classrooms.

In collecting information to provide insight into these issues, I intend to:

- select Foundation phase teachers who would voluntarily participate in the research.
- observe the selected and willing teachers during their IPAD lessons and the use of the Apps in the lesson
- interview each of these teachers regarding their experiences of the use of the IPAD and Apps, with reference to my observations in their classes
- conduct a focus group discussion with the remaining Foundation phase teachers, with their consent, where we will discuss their experiences of the use of the IPADS and the Apps they are using in the classroom
- approach parents of the learners in foundation phase for permission to observe the IPAD lesson
- request learners' assent before the observation.

The school and all participating teachers are ensured of absolute confidentiality, anonymity and privacy. No names will be used in the study and participants will be provided with Pseudonyms in order to maintain confidentiality in the written reports that follow. I will ensure that the data collection process does not interfere with valuable teaching time or therapy sessions in any way.

I will provide participants with my observation notes and the recording and transcripts from the focus group interview should they request it. Participants are also free to edit it and to remove information that they would not like to be included in the study. All information acquired, analyses done as well as a copy of the final report will be made available after completion of

the study to the school and will be the sole property of the University of Johannesburg. All data will be securely stored and will only be available to myself, the participants and my supervisor.

I hereby formally request your consent to participate in my study. Please do not hesitate to contact me or my research supervisor if you have any further questions. I would also appreciate it if I can contact you if further information is required.

Kind regards

---

Denise Northcott

[denisenorthcott@gmail.com](mailto:denisenorthcott@gmail.com)

Masters Student

---

Dr MP Van der Merwe

[martynvdm@uj.ac.za](mailto:martynvdm@uj.ac.za)

Research Supervisor

**DEAR FOUNDATION PHASE STAFF**

Please complete the following consent form:

I \_\_\_\_\_ teacher / therapist at Crossroads School give my consent for participating in the research study being conducted by Denise Northcott (a Masters student in Educational Psychology at the University of Johannesburg) by:

- Selected Teachers who will be observed during their IPAD lesson and then will individually interviewed regarding their experiences
- The remaining foundation phase teachers that were not selected for observations and interviews will be invited to a focus group discussion, which will discuss their experiences of the use of the IPADS in the classroom the apps they are using what they find works and what they struggle with.
- The parents of the learners in foundation phase will be asked for permission to observe the IPAD lesson
- Learners will also be asked for their Assent before the observation.

I give my consent for:

For my participation in the research	
The Individual interview to be audio-recorded.	
For observation to take place in my classroom	
The focus-group interview to be audio-recorded.	

Signed at \_\_\_\_\_ on \_\_\_\_\_

Signature of staff member





## APPENDIX D: DATA ANALYSIS

### Interview 1

line no.	Speaker	Conversation	Comment 1 and analysis 1	Analysis 2 basic themes
1	DN	Thank you for taking part in my study.		<b>Time period used</b>
2	T1	It's an absolute pleasure		lessons are 30-40 min once a week ( Line 6)
3	DN	I've just got some questions. You have an iPad lesson, where you use apps with children.		
4	T1	Yes.	not enough support for literacy , can do more (line 20, 22,23)	<b>Used for</b>
5	DN	I'd just like to find out from you, how do you find using the iPads in that lesson?		Used to consolidate concepts (Line 7)
6	T1	Since we only have the iPads once a week, it's for maybe a 30 to 40-minute lesson. It's		Maths concepts (Line 11 and 16 and 18)
7	T1	quite short to plan a lesson. We usually try to use that lesson to consolidate concepts we've	Used to consolidate concepts (Line 7)	Concepts consolidation, time, place , value , money ( line 17)
8	T1	learnt in the week, so we can do it in a fun way. We use apps like Kahoot! and then we	Maths concepts (Line 11 and 16 and 18)	Creative Writing (line 12)
9	T1	consolidate concepts there. Or we use the Mathletics app which the school has provided for	Concepts consolidation, time, place , value , money ( line 17)	Literacy (Line 18)
10	T1	the learners, and the teacher can allocate tasks for the learner. And then from there, it gives	Creative Writing (line 12)	
11	T1	us a graph to see if they've understood the maths concept or not. We also just let them	Literacy (Line 18)	<b>Apps used and for what</b>
12	T1	explore on the iPad. We do some creative writing using the iPad with Puppet Pals where		Apps used Kahoots, (line 18 and 8)- gives both maths and literacy
13	T1	they can work in groups. But like I said, since it's just once a week and we don't have our		Puppet pals- creative writing
14	T1	own iPad, it's difficult to plan a lesson on there.	Apps used Kahoots, (line 18 and 8)- gives both maths and literacy	Mathletics - maths (Line 9)
15	DN	In terms of the apps that you were speaking about now, what learning areas are these apps focused on? You mentioned Mathletics, so I'm assuming that's maths.	Puppet pals- creative writing	
16	T1	Yes, so that's maths and then they've got all the concepts that we've done in the year.	Mathletics - maths (Line 9)	<b>Identified learners</b>
17	T1	They have time, place, value, money... all of the concepts we've done. And then we mainly		there are adhd learners (line33 )
18	T1	use it for numeracy and literacy. Kahoot! will have literacy as well.		they enjoy it more than just normal , conventional , sitting -behind-the desk looking at the teacher typer of thinking. (line 36 and 37)
19	DN	Do you feel that there is enough support for reading and that kind of thing? The literacy aspect?	This is short (Line 7)	
20	T1	No	not used to full potential could do more (line 24 ,25)	helps anxious learners ( line 39)
21	DN	You mentioned the graphs and things like that?	not enhancing or making teaching better (line 29)	
22	T1	That's just for the Mathletics. I think we can do with more support with the literacy, with	new to the school (line 30)	<b>Advantages of useage with these learners</b>
23	T1	the reading and use it more in a variety of ways. The school has given us some training on	not seeing benefit currently (line 31)	more exciting (line 37)
24	T1	iPads, but I just think if we had an iPad per class to explore a bit more, as a teacher, we'd be		captures attention (line 37)
25	T1	able to use it more effectively.		they want to learn on an Ipad (line 38)
26	DN	That links to one of my questions about the challenges you face as a teacher using the		learn in a fun way (line 40 )
27	DN	iPads - feeling whether it's effective or not effective and what makes it work and	Not enough time (line 13)	

28	DN	doesn't. Would you like to touch a little bit more on any of those?	don't have own Ipads (line 14)	Problems Identified with the Ipad usage
29	T1	At this point, I don't find it to be enhancing or making my teaching any better if I may say	use the same apps all the time (line 46)	Not enough time (line 13)
30	T1	that. I think it's new to the school as well and once we've had it for longer, we'd be able to	don't have own Ipads (line 14) (line 47)	don't have own Ipads (line 14)
31	T1	use it more effectively. But at this point, I don't see it having much benefit.		use the same apps all the time not enough apps (line 45) (line 46)
32	DN	And then in terms of your class dynamic, have you got learners that are in particular diagnosed with ADHD?		don't have own Ipads (line 14) (line 47)
33	T1	We do. I have three learners in my class diagnosed with ADHD.		This is short (Line 7) (30-40 min lesson)
34	DN	And these devices? Do you feel that they support these learners in any way during that	Need more training (line 23)	not used to full potential could do more (line 24 ,25)
35	DN	lesson? Do you find it helps them gain a concept or any support for them in particular?	Need more time with device to find apps (line 43 and 47)	not enhancing or making teaching better (line 29)
36	T1	They surely enjoy it more than just the normal, conventional, sitting-behind-the-desk,	not enough apps (line 45)	new to the school (line 30)
37	T1	looking-at-the-teacher type of thinking. It is more exciting, and it does capture their attention		not seeing benefit currently (line 31)
38	T1	more, so they are definitely going to want to learn more from using the iPad. And also, those	there are adhd learners (line 33 )	
39	T1	learners that are a bit more anxious, I think it helps them as well to be able to learn	they enjoy it more than just normal , conventional , sitting -behind-the desk looking at the teacher type of thinking. (line 36 and 37)	There is potential
40	T1	something in a fun way. And when they're not always willing or comfortable to put up their		can make a difference (line 46)
41	T1	hand to ask a question in class, they can try and explore the concept on the iPad.	more exciting (line 37)	not used to full potential could do more (line 24 ,25)
42	DN	Any other comments related to the iPads that you feel would be informative, like in your experience, what you think could be beneficial?	captures attention (line 37)	Suggested Solutions
43	T1	I think we as teachers need to take more time to try and find apps that we could use	they want to learn on an iPad (line 38)	Need more training (line 23)
44	T1	more in the classroom that will be more beneficial towards our teaching. Because like I said	learn in a fun way (line 40 )	Need more time with device to find apps (line 43 and 47)
45	T1	it's a new thing to this school, we just have a handful of apps and then we use the same		Need more apps (line 45)
46	T1	thing all the time. If we take more time to find things, then I'm sure it will help our teaching	helps anxious learners ( line 39)	
47	DN	But you also mentioned that the limitation of not having your own iPad to use... to have that time to do... .		
48	DN	All right. I think we've covered all the questions. Thank you	can make a difference (line 46)	

## Interview 2

line no.	Speaker	Conversation	Comment 1 and analysis 1	Analysis 2 basic themes
1	DN	All right. I'm just asking a few questions about how you use the iPads in your lesson.	bit of a waste of time line 5	Time period used
2		How you experience it and from your point of view.	about 20 minutes and then for 10 minutes, line 10	bit of a waste of time line 5
3	T2	Okay.	don't think there is enough to be quite honest. Line 14	about 20 minutes and then for 10 minutes, line 10
4	DN	How do you find using the iPads?	puppet pals line 82 and 83	don't think there is enough to be quite honest. Line 14
5		Sometimes it's a bit of a waste of time. I have been using it for Kahoot! The night before my	Kahoot line 5 and 6 , 31 , 36, 40	
6		iPad lesson, I actually make a Kahoot! based on what we've been learning in class. For example,	mathletics line 11	
7		we've been doing symmetry, and then we did doubling, and we've done halving. For symmetry, I	literacy line 82	
8		actually worked out a thing, and it was to ask the kids, "Is this symmetrical?" and then they had	doubling , halving, symmetry line 7,8, 32	
9		to say yes or no. I try and do a lot of that. I've used it for blending the sounds. And then that	blending sounds line 9 and 16	
10		usually lasts about 20 minutes and then for 10 minutes, I actually let them do their own thing.	sounds line 15	Used for
11		They don't enjoy the Mathletics. They are sick of Mathletics, they don't want to do it anymore.	bonds line 22 and 23	literacy line 82
12	T2	That's what I do. There are days where I do nothing, and then they just play.	only use what trained in line 75 and 79	doubling , halving, symmetry line 7,8, 32
13	DN	And in terms of the apps and things that you are using - you mentioned now a few of them	only use whats on the ipad line 73	blending sounds line 9 and 16
14		I don't think there is enough to be quite honest. I think we need more apps.	to young to copy codes off the board line 37 and 38	sounds line 15
15		Being a Grade 1 teacher, I think we need more apps that are based on the sounds and the	they just play line 12	bonds line 22 and 23
16		blending of the words to make simple words in a game form. Because when it's not in a game	learners who dontlike lpad line 29, 32,33	
17		form, they actually see it as hard work, but when it's in a game, they actually tend to play it		
18		better. You used to, many many years ago, get a thing on the computer and I used to do it with	play better and learn through play line 17 and 18	Apps used and for what
19		It was JumpStart. It was a program, a computer program, called JumpStart and that	learners are enthusiastic line 28	puppet pals line 82 and 83
20		was based on the... there was one little one I can remember, it was a river, and it had pictures		Kahoot line 5 and 6 , 31 , 36, 40
21		of things or articles on the raft going down this river, and then you had to pick the correct letter		mathletics line 11
22		that they all started with. Then there was another one where it was bonds, and then once		
23		they'd got all the bonds correct, the rocket took off. That, I think, would be far more		
24	T2	appropriate than what we're actually doing in class and on the iPads.		
25		From what you're saying, what challenges are the apps. What are other challenges you're		
26		facing when using the iPads? What are the issues that come up obviously as using it as a		
27	DN	teaching tool?		Identified learners
28		Some of the kids are very enthusiastic, but I also have children like who don't	6 out of 10 learners in my class are ADHD	6 out of 10 learners in my class are ADHD
29		like using the iPads. Especially He will refuse and actually won't even touch the iPad.	they love being able to read line 46	they love being able to read line 46
30		He won't even open it some days. He refuses to even touch it. He is getting slightly better.	because they present with reservals line 47	because they present with reservals line 47
31		He will do the Kahoot! He did it this week. He played Kahoot! with us which was the symmetry	makes them feel in control line 50	makes them feel in control line 50
32		one. And he did quite well on it actually. But there are days when he won't touch it. What do		
33		you do with a child when you are teaching on the iPads, and he doesn't want to do it.		
34		Then I have to find something different for him to do which is not even on the iPad. I find it quite		
35		a challenge like that. And some can use the iPads quite well and others can't. They've never		
36		used an iPad. For example, putting that Kahoot!'s code in. Oh, my goodness! There's some of		
37		them who can't do it at all. They can't transcribe from the board because it comes up on the		Advantages of useage with these learners
38	T2	board onto the paper... onto the thing. I have to walk around and do it.		play better and learn through play line 17 and 18
39	DN	Which is time-consuming.		learners are enthusiastic line 28
40	T2	It wastes time. I like that Kahoot! though. I do enjoy it.		
41		And in terms of the children in your class, the dynamic – Are there children that are		
42		diagnosed with ADHD that you feel that maybe it's helping, maybe it's not helping and in what		
43	DN	way do you think it could be helping them?		
44		I've got quite a few ADHDs in my class. Probably six out of 10 are ADHD and on meds.		
45		My other challenge... I've got two... I've got little who reverses all his letters.		

46		For him to actually try and read something on the iPad is very hard. He struggles with that. it		
47		And then I've got who has got such severe spacial problems, he can't actually see that		
48		numbers or letters are together. They're fragmented for him. They're all over the place. He can't		Problems identified with the Ipad usage
49		see an 'a'; he can't see a 'b'. That is quite a challenge for him. But once the iPads are going, they		only use what trained in line 75 and 79
50	T2	actually all very quiet and they are very well controlled, and they do enjoy		only use whats on the Ipad line 73
51	DN	You say they enjoy it. What are some of the benefits you feel that iPads could provide?		to young to copy codes off the board line 37 and 38
52		For my kids who reverse things, I think it would be a great benefit if they could put their stories,		they just play line 12
53		for example, or their sentences, if they could actually maybe type them up on the iPads and we		learners who dontlike Ipad line 29, 32,33
54		could maybe then print it and put it into their books somehow or other. Or they could voice record		
55		it, and it would then, you know, type it up itself, and we could then print it. But at this stage,		
56		I would prefer that they would actually type it. Because then you would reduce those reversals		
57		and the rubbing out and the doing things a hundred and ten times over trying to get the letters		
58		correct. Although they do need it. They do need those... They do need to write. They do need to		
59		learn to write. But for story writing, it would be quite nice to be able to say, "Right,	, voice record , reduce reversals line 52-60	
60	T2	here's your iPad. Let's type your story." I think that would be quite nice for him.	put their stories on , let them type line 52-60	There is potential
61	DN	And remove some of the anxiety.	benefit learner line 68	
62	T2	Definitely.		, voice record , reduce reversals line 52-60
63		If you could improve the lessons or the usage of the iPads, what are the main things that you would		put their stories on , let them type line 52-60
64	DN	focus on changing or adapting or including to make it a more beneficial lesson?	Jumpstart line 19	benefit learner line 68
65		Gee... I think I... Me personally, I would need time to work on the iPad and find all the apps and	more training line 84	
66		find the... We should be allowed to maybe be able to... I understand why we can't download all	more time with an Ipad line 77and 78	
67		the apps that we want because then there will be thousands of apps from a hundred and ten	more time to look at apps line 69	
68		teachers. But if we could actually download an app that would benefit our children, I think that	allowed to download apps and try them line 66	
69		would help. Or if I had time to look for the apps. Because my problem is I don't have an iPad at		
70		home. I go to the computer room to get an iPad, and it's locked. I can't get them after school		
71	T2	to actually sit and look for something. It's a bit of a waste I find.		
72	DN	You're very limited to what you can use.		
73	T2	I can only use what they put on.		
74	DN	And what you've been trained in so far.		
75		And what we've been trained in. But there must be a lot more that we have available to us.		
76		I often look on the computer and find stuff, but I can do it at home. I don't have to sit at		
77		school and do it. I think if we had more time or available iPads or we were allowed to take one		
78		home and be able to sit during the evening and actually look for stuff, it would be a lot more		
79		beneficial. And then, I think a bit more training in things that are more appropriate to what		Suggested Solutions
80	T2	we are doing		
81	DN	For example, the literacy.	Jumpstart line 19	
82		The literacy. I don't use Puppet Pals and things like that. They play with that. My kids all play	more training line 84	
83		with that. But we've been trained in Puppet Pals. I don't need training in that.	more time with an Ipad line 77and 78	
84	T2	I want training in something that will help me with my kids.	more time to look at apps line 69	
85		Foundational skills. Thank you so much for your time. If you don't mind, I will maybe come	allowed to download apps and try them line 66	
86	DN	back and ask you more questions.		
87	T2	That's fine. With pleasure.		



### Interview 3

line no.	Speaker	Conversation	Comment 1 and analysis 1	Analysis 2 basic themes
1	DN	So, basically, it revolves around the iPads.		Time period used
2	T3	: Hm'mm.		
3		And I'm just doing some research in connection with how we use the iPads, in particular with	too little time 30 mins line 48 and 50	too little time 30 mins line 48 and 50
4	DN	ADHD learners.		
5	T3	Okay.		
6		What apps you're using, what you're finding is working, what's not working. It's also a new		
7		device that's being implemented at the school. So, from your perspective, how're you feeling		
8		that's going and that kind of thing. So, let's basically just look at your (perceptions/sections?)		
9	DN	and experiences and everything.		
10	T3	Cool.		Used for
11	DN	So, just start in general, how do you find using the iPads?	Academic enrichment line 14	Academic enrichment line 14
12	T3	Well, the kids love them.	story retelling line 17	story retelling line 17
13	DN	Okay. The kids (love it?). Okay.	reinforcement line 33	reinforcement line 33
14		And we can use it for all sorts of academic enrichment. So, my very strong kids, I'm using it for		
15		Mathletics. And for the weaker ones, we're doing a lot of perceptual bands. My strong ones can		
16		use the EduMaths/Eggy Maths. When I've done teaching lessons, we've used the Puppet Pals.		
17		We've done a lot of story retelling on Puppet Pals which is quite cool. And they really love that		
18		because we can then watch it afterwards and they've created something.		Apps used and for what
19		We've used Kahoot! but only once because that didn't work because they can't log themselves		Kahoot line 19
20		in. Then I've got to log them in, and that's a problem. So, the Kahoot!, they're just too little.	Kahoot line 19	Mathletics line 15
21		Although the content of them is lovely and they love racing each other. But by the time... half	Mathletics line 15	Puppet Pals lines 16 and 17 ,34
22		the lesson's gone by the time I've put them in. It's also why I can't use Mathletics with them as	Puppet Pals lines 16 and 17 ,34	Lego line 25
23		a group. I have to use it only with one or two children at a time and let the others do other	Lego line 25	
24		things. We've had our iPad lesson at the end of the day which has made it not very valuable for		
25		teaching because the kids are finished. So, we've done Lego, and we've done games quite a lot		
26		because, by half past twelve, they're done. It would have been much more beneficial as a		
27	T3	teaching tool to have it earlier in the day. So, that's really what I'm using and how I'm using it.		Identified learners
28		Okay. And in terms of the benefit to the learners, do you feel that the	There are ADHD learners concentration better line 38	There are ADHD learners concentration better line 38
29		programs and the apps that you are using benefit particular learners and they're possibly		
30	DN	learning skills that maybe they wouldn't learn...	They cant log in themselves line 19	
31	T3	In another way?	wastes time line 21	
32	DN	In another way.	cant use mathletics line 22	
33		No. I'm using it only for reinforcement, but that's partly because of the time of day I've got	ipads at the end of the day line 24 and 26	
34		them. Only really the storytelling with the Puppet Pals gives them something they wouldn't get	no time to prep and pre needs to be extensive line 49	
35	T3	in another way.		
36		Okay. And in terms of your ADHD learners, you know who they are in your		
37	DN	class. Do you find that concentration or...?		Advantages of usage with these learners
38		Oh, concentration on the app... on the iPads is much better. I don't have any concentration	benedical to teaching line 26 and 27	works as a reward line 46
39		issues at all even though it's at the end of the day. As long as they're playing games. If they're	Playing a game and working line 39 and 40	Concentration on the app is much better line 38
40	T3	playing games, they fine. If I'm trying to teach a lesson, then I may as well not bother.	works as a reward line 46	
41	DN	So, you feel they need possibly more challenging...	Concentration on the app is much better line 38	
42	T3	More challenging and different...		
43	DN	But different...		
44	T3	Because they're doing the same thing over and over again.		

45	DN	Okay. And then any other comments in terms of the iPads?		
46		They <b>work nicely as a reward</b> . But we actually need more access to them. The <b>teacher needs</b>	<b>Teachers need access before the lesson</b>	<b>line 47</b>
47		<b>access before the lesson</b> , so we can actually set up the lesson. It's very difficult to teach on a		
48		<b>tool that you only see for half an hour a week</b> . You can't actually use it as a tool for teaching		<b>Problems Identified with the Ipad usage</b>
49		<b>because you can't prep. And with the little ones, the prep has to be quite extensive because</b>		<b>They cant log in themselves line 19</b>
50	T3	<b>they need to only do small bits at a time. And there's not enough time for that.</b>		<b>wastes time line 21</b>
51	DN	Perfect. Thank you so much.		<b>cant use mathematics line 22</b>
52	T3	Pleasure. Is that all you need?		<b>ipads at the end of the day line 24 and 26</b>
53	DN	Yeah. I'm glad we did that. I'll let you get on with...		<b>no time to prep and pre nees to be extensive line 49</b>



**There is potential**  
**Playing a game and working line 39 and 40**  
**bnedicial to teaching line 26 and 27**

**Suggested Solutions**  
**Teachers need access before the lesson line 47**

## Interview 4

line no.	Speaker	Conversation	Comment 1 and analysis 1	Analysis 2 basic themes
1		Okay. So, just from your experience, we'll start off with just how you feel the experience is		Time period used
2		using the iPads in class? What you feel you're seeing? How the kids are interacting with the	Apps not adauite line 17	half an hour is not enough line 11 70
3	DN	device? What you're using? All those little things. How you're experiencing it?	Wifi slow line 12	
4	T4	Okay. The kids love it. They especially love Lego. Sorry, let me close that door. They love the	Kahoot creates frustration	
5		Lego app because it's a game, not a work, but they get (five minutes a bit?) at the end. I don't	Don't think we have enough apps line 5,6	
6		think we've got enough, but that will be sorted out. I mean I realise that that's when we make a	Eggy maths line 36	
7		decision on which way we're going. Kahoot! is great but it can cause such frustration with the	Lego App Line 5	
8		children. I think because I've got some kids who just lose it when using Kahoot!, I don't know if	Kahoot line7, 8, 9,11	
9		you do too, but (?) just... and some love it. So, I think the more you use Kahoot!... Because it	Purple mash line 23	
10		really makes them think. I think the more you use it, the more they actually get used to it. But	Eggy perceptual line 45	Used for
11		somehow half an hour for Kahoot! is not quite enough. Unless you start immediately, you	half an hour is not enough line 11 70	maths and literacy line 33
12		know. And then if the Wi-Fi is not fast then, well they struggle to get on and then... so, those		bonds line 37
13		frustrations with certain of the things. But I think it's the way to go. I think there's a lot we can	There is a lot we can do line 13	
14		do on it. And I'd like more training on the coding, which I know nothing about, which hopefully		
15	T4	we're going to learn and learn to use while they use it in their lessons		
16	DN	And in terms of the apps and things that are on the devices, do you feel the apps are adequate?	maths and literacy line 33	
17	T4	No, we need a lot more.	bonds line 37	
18	DN	Okay.		Apps used and for what
19		But I mean, we've been... because we can't make decisions, and also, we had all that hiccup	need more apps line 17	Eggy maths line 36
20	T4	going over from Lightspeed to the new system.		Lego App Line 5
21	DN	Okay.		Kahoot line7, 8, 9,11
22		So, that has caused us the delay. I mean we've got money set aside for apps, and we just need		Purple mash line 23
23		to now (sort of look at it?) I would also like... would really like the Purple Mash (one?) because		Eggy perceptual line 45
24	T4	that's got coding and everything on it.		
25	DN	Okay.		
26		But that would be next year. And then the children will have a variety (of it?).		
27		used to, they can't do. And I think that will be ironed out as the teacher	teachers need get more knowledge on how to use the devices line 27 and 28 31,32	Identified learners
28		gets more knowledge of how to do those sorts of things.		
29		I also think it's very frustrating because some of the apps sometimes don't work, but		fun and they hold their concentration
30		hopefully... or you know or only work halfway, or what they're used to, they can't do. And I		
31		think that will be ironed out as the teacher gets more knowledge of how to do those sorts of	Learning through fun line 41	
32	T4	things.		
33		Okay. And in terms of focus areas, if you look at maths and literacy, in using the device?		
34		particular, those two areas, what do you find works well? Do you think the device can support		
35	DN	the learners in those two areas? Are they learning while using the device?		
36		I think so. I think because we've only got EduMaths/Eggy Maths now, I think it has really got		
37		them going with their bonds. They love to play that one where you throw the pie in the		Advantages of useage with these learners
38		grandpa's face. And it's amazing how, when I look at the beginning of the year, how they	Seen progress when they started at the beginning of the year they couldn't do them now they are able to play the game and get the answer right line 38-40	Seen progress when they started at the beginning of the year they couldn't do them now they are able to play the game and get the answer right line 38-40
39		couldn't work that out and now how they've progressed even through the first level and some		



## Focus Group

line no.	Speaker	Conversation	Comment 1 and analysis 1	Analysis 2 basic themes
1		Welcome. I'm going to be asking a few focused questions, and we'll just take the discussion as it goes.		Time period used
2	DN	I wanted to find out from you guys how you guys find using the iPads in your class? Your experience?		bit of a waste of time line 5
3	T5	I don't feel I'm trained enough	Not enough training line 3, 15, 35, 36	Time is a problem, need to play and plan an explore not time at school line 25 and 26
4	T6	To use it properly		we need time line 65 195,195
5		I'm new here, so we didn't have iPads at my previous school. I like to use the iPads in the Kahoot! game		time is so limited line 142, 143,
6		that they taught me about and I use it for doubling and halving and sometimes just something fun for		30 mins line 144,150,148, 151
7	T7	them to do as well. Or Mathletics. But I'm not really trained as well.		time is limited line 184, 185
8		In some of the discussions, a lot of the teachers spoke about maths as being one of the focus areas of	Kahoot line 5, 75, 77, 73,89	need time to finish a lesson line 185-186, 188-189
9	DN	the apps and things that are on the iPads. Do you feel there's enough in terms of the other learning areas?	Mathletics line 7, 42, 43, 44	
10	T5	No		Used for
11		No. There are some programs. They have Reading Eggs or there's that Duck, Duck, Goose whatever or Duck,		Doubling halving
12	T8	Duck, Moose or whatever...	Doubling halving	maths line 77
13	T5	I like that, yes.		Plus minus line 76
14		And that's quite nice for language, but I do think that they can definitely, they need to add on onto that. I think	Not enough apps about literacy there are a lot fo	letter formation and tracing line 59
15		for me... yes, with the training we haven't received enough training but also in the class setting, the apps that	earphones too many kids in class line 16	reinforcement line 60
16		we do use, it makes it... for example, we don't have earphones. So, now you have sound going, and it's 11 kids,	overstimulated line 18	verbs nouns adjectives line 75 (kahoots)
17		and every device is loud because otherwise, they can't hear. So, then the kids... you can quickly become		reinforcement line 202
18		overstimulated, and I think that's something we need to address. Every kid should have their separate,		Apps used and for what
19		like their own headset or earphones so that they can work on the iPad. Because I do feel it really does add to	own earphones line 19	Kahoot line 5, 75, 77, 73,89
20		your class and if we could use it, it would make a big difference. For me, the fact that – and I get financial		Mathletics line 7, 42, 43, 44
21		complications - but that we have one set of iPads for the whole school, it's challenging. I feel you should	one set of ipads for the whole school line 21	
22		incorporate it more into day-to-day and not just... yes, have isolation, but sometimes kids who have for...		
23		to (expect/extend?). So, if every teacher could have their own iPad that we could use as an extension for the	use it to extend and expand kids line 22	
24		kids, I think something like that would be brilliant. And I think for me, to play on myself, I don't... Where do I...		
25		I don't have time to go and sit and play the games myself or experiment and see what I like because I don't	Teachers need own ipad line 23, 37, 38	
26	T8	have admin periods and then I also don't have my own iPad. So then, how am I supposed to enrich my kids...	Time is a problem, need to play and plan an explore not time at school line 25 and 26	
27	T5	Or find...		Identified learners
28		Or become better or find greater apps or fully understand the app. What's been great for me...	need more apps and time to look for them line 2	some learners present with anxiety line 78,85,88
29		Sorry, I'm talking a lot now... but for me what's been great is that I feel with our new computer teacher,		Spectrum kids become obsessive line 93,95,96,97
30		she is in the computers... what she does with me is we have computers and then work on the physical		they want to finish activity so that they can have free time line 98 and 99
31		computer, and they do things like PowerPoint or whatever, but then she also has app lessons. And for me as a		
32		teacher that's amazing because she's going to the courses and it gives me an opportunity to see, 'Oh, this is		personal for each child, why can others do this and they cant causes a ripple effect line 101-105
33		how it works. This is how...' So, I'm getting that training kind of from her and then I take that, and I implement	training from other staff helped line 33	need to have boundries in place line 101
34	T8	it in the classroom. And that for me is nice. Whereas I feel previously we didn't have that.		
35		I feel that we were actually... We did do training, but the training was based on the senior primary, it wasn't	training wasn't based on foundation phase line 35 nd 36	
36	T9	based on junior primary.	time to figure out the games line 40	
37		I fully endorse what said. You can't give someone a tool without letting them have the opportunity	leveling and differenetiation needs to happen li	Advantages of usage with these learners
38		to actually practise it themselves. Especially when you're aged like myself and I don't have an iPad at home,		multi sensory line 58
39		and I have no desire to have one. But at school, I can see the benefits of it, and for the children, I can see the		ADHD learners sit and are focused
40		benefits of it. But I need that actual one-on-one time with an iPad to figure out what the games are, and which		
41		one would be best for which child and what level they are at. Because I've got children that are doing Grade 3	There is nothing really for them to do except for maths and mathletics it gets boaring line 42, 43,44	
42	T5	maths and then there's nothing really for them to do, except for Mathletics...		
43	T9	Mine were very bored... They're very bored of Mathletics...		

88		I have some that their anxiety is so high that they actually won't even play the Kahoot! They won't even take an iPad if I'm going to do Kahoot! Because it's just too much for them.		need facilitator for some learners on the iPad line 93 need assistance 131, 136
89	T9			
90		It was mentioned about ADHD learners. Can you guys identify ADHD learners in your class that you feel would benefit from this and that you could maybe use in a more practical way directly for them?		split the class line 137-140
91	DN			need concrete apps 160
92		Also, another issue for me... children that are on a spectrum of very obsessive so that they become very		visual apps line 161
93		obsessive, which I've had because I've got someone whose facilitator works on an iPad and then it's become an issue. And he is so wanting to play his little games that are on the particular iPad. They're not necessarily		need right apps 161
94		educational games, but he gets (fixated?) with it. And one doesn't want to make iPad too much of the school day.		need time with apps line 63,64
95		Because it could become a fixation for some of the children, especially children who easily become		Need other apps line 44
96		obsessed with something.		training wasn't based on foundation phase line 35 and 36
97	T5			own earphones line 19
98		I think for me as well you say they can have off time, like with the ADHD kiddies, they kind of... that's all they can		add value line 58
99		think, all they're thinking of is, "I need to get this done so that I can go have off time" and it's potentially the	they want to finish activity so that they can have free time line 98 and 99	need to be able to differentiate line 66
100		same thing with the iPad. But then I also have another kiddie who has ADHD whose... when I say... he's got that		some kids guess and do their own thing that wrong line 83, 84,87
101		boundary to know, "You can do this first, if you've done it properly, then you may have five minutes off time or	personal for each child, why can others do this and they can't causes a ripple effect line 101-105	school says too expensive, I don't want that app use this they block you line 48 and 49
102		two minutes, and then you're going to go back and do the next activity", and he was able to do that. But I think	need to have boundaries in place line 101	they don't have the apps on line 50, 52
103		it's so personal for every child, and sometimes it's hard for the kids to understand that. They don't always		differentiation line 116
104		understand why one child can do it and why the other can't and then it... you have a ripple effect or		teach iPad from scratch line 134
105	T8	something else.		differentiation line 138
106	T5	We also don't have the iPads in the class...	no iPads in the class line 106, 107	some go fast some can't get in 146-148
107	T8	Yes. So, it makes it challenging	can't use iPads as reward because they not in class	is it reaching full potential no line 155,156
108	T9	That's another problem. You can't really say go and have off time when you've got no iPad.		no focus on the foundation phase 157-159
109		But for me with planning, because I think a lot of them have planning... because they're so impulsive and in a	planning, coding line 109 and 110, 123	Computer teacher helps seniors with iPad lesson not in foundation phase line 176-181
110		hurry or... There's a nice coding game where it literally... they have to take the fire truck and get it to where it		easier to put on kahoot becomes a waste not using it properly line 189-191
111		needs to go, and that slows them down because they're playing a game. So they're motivated but they're still	motivated to learn line 111	use the device as an assistive device when doing story writing
112		learning how to stop. We've got a thing at school where it's 'Stop, think and go' and this lets them stop and think	create safe space for mistakes line 115	recording device, writing line 197-200
113		about, "What's my first step? What's my second step? What's my third?" And then when they do the wrong thing,	differentiation line 116	not doing what I suppose to line 192
114		they see, "Oh, oops! This is where I went wrong", and then they have to redo it. And I think with that; it's also a		
115		safe space. So, they tend to be comfortable, "It's okay if I made a mistake". Some of them then get extremely		
116		frustrated if they can't get it right, so if a game is personal, and it depends on the child. But there are brilliant things		
117		that can really, really help. And the nice thing for me is that the kids don't really realise what they're learning and	master a skill or reinforce a skill line 118	
118		they're just playing so it's very exciting. But yet it gives them an opportunity to master a skill or reinforce a skill	stops it being boring line 119	
119	T8	without it being too boring or "I'm tired. I've done this 50 million times" or whatever.		
120		Like you were saying, we're reinforcing certain concepts in a game that maybe they've become frustrated		
121	DN	with or anxious or whatever.		
122		I love the coding. I think it's great. I think it's very, very beneficial. (But I also saw their frustration?)	coding line 122	
123		and they want your assistance because they don't have that planning and they don't have the sequence	very beneficial line 122, 116 and 117	
124		yet, so it's good for them because they need to learn it. But you don't want to put them in a position	Sequencing line 123	
125	T5	where they...		
126	T8	Constantly fail...		
127	T5	That's the only thing.		
128		But then also, just from what you're saying, would you say that it's difficult		
129		to implement iPads as a class and to provide assistance for each learner on the level		
130	DN	where they're at and for the need that they require?		
131		So, for me, at the beginning of Grade 1 - this is also before I had an assistant -	need assistance 131, 136	

132	T8	it's so hard just to get them to log in...	to hard to log in line 132 , 145
133	T9	Yes.	
134		Because they don't know how to use an iPad, so you literally have to teach them everything from scratch. Now,	teach ipad from scratch line 134
135		then you log them in and then "Oops! Sorry, I have now accidentally locked myself out", and then we start again.	login in and login out line 135
136		And it would be so much... now I have an assistant and she just helps me log in then she has to leave but just the	
137		fact that I have someone to help me log in is already making a huge difference. So, if we could split the class into	differentiation line 138
138		like halve it or split it into three groups and work like that it would definitely be more beneficial. And I think you could	split the class line 137-140
139		then help the frustration because you'll know which kids get frustrated and you could kind of intervene before	
140		they get to that point. But if it's you and it's one teacher and 11 kids or in some places more than 11 kids,	size of class line 141
141	T8	it makes it challenging.	
142	T6	And your time is limited.	time is so limited line 142, 143,
143	T8	Your time is limited.	30 mins line 144,150,148, 151
144	T9	You've got half an hour.	
145		You can't get to everyone in that time, and then you get a kid that's really frustrated, and he can't do this	pack up before next teacher gets devices line 149
146	T6	and then one that's...	
147	DN	I'm bored.	some go fast some cant get in 146-148
148	T6	Flying through the activity, so it's hard, and you've got 30 minutes to get everyone to do something.	
149	T8	And because we're sharing, it's also... I need to be packed up before the next teacher comes, so...	
150	T2	So, it's actually 25 minutes.	is it reaching full potentail no line 155,156
151	T8	It's 25 minutes, and then you must hope that the teacher that has them before you brings them on time, so it's	
152		little things like that that make it a little bit more challenging.	
153		I think you guys have covered a lot of the questions that I needed to ask just in the general discussion. Just a	
154	DN	final thing, from your point of view, do you think they are being used to their full potential?	
155	All	No	
156	T9	No, I don't think so.	
157		I think also there's a lot of emphasis with the older kids where if they need whatever... a device or just the	no focus on the foundation phase 157-159
158		technology or whatever, it's more... the focus is more there. I sometimes feel the Foundation Phase is	
159		neglected in that regard and the kids can actually benefit. Because I think especially in the remedial environment,	
160		things need to be concrete, there needs to be different... like the fact that there's music and if there's... it just	need concrete apps 160
161		makes... if it's visual, those things make such a huge difference to our kiddies. And having the right apps,	visual apps line 161
162	T8	I mean that makes a huge difference.	need right apps 161
163		I mean if we were able to have two iPads in the classes every day. A child who is battling with, I don't know,	
164		spelling something or you know because we start writing stories, they could actually just look on the iPad	2 ipads in class everyday all day line 163
165	T9	and look it up. Or they could even write their story on the iPad.	use it to assist with spelling 164
166		If I take for example with us for news, it is crazy on a Monday with one person, 11 kids. Our kids don't really know	use it for story writing line 164
167		how to write, never mind how to spell, so if we had an iPad and they could, for example, have a headset, and they	new line 166
168		could speak into the iPad, it could write it for them. And we wouldn't have to run around like crazy people	assisitve device speak into it line 167
169	T8	trying to get the...	
170	T9	Write the sentence...	
171		Write the sentence and then by the time you've written this sentence, this one is doing who knows what or has	write sentences line 170, 171 and 172
172		written their news in completely the wrong place. So, something little like that could make a huge difference.	
173		And for me, it also teaches them the skill, "I'm not dependant on a person. I can find my own way to solve a	creates independence 173, 174, 175
174		problem." And then there's also that thing. Obviously they sound the word, they don't need to ask for my input	
175	T8	to... "Is that the correct word?" They can see, "Okay, 'cat'. How do we sound it?" And then it says 'cat' or...	
176	T5	Can I ask a question? Up in the seniors, do they have the computer teacher with them when they have the iPad?	Computer teacher helps seniors with ipad lesson not in foundation phase line 176-181
177	all	Yes.	
178	T8	But we don't.	
179		They also have someone with more experience in the iPad, and I mean, we only had the sessions that we had,	
180	T6	and a few of them I felt were such a waste. I know what she taught me and that's basically it.	



181	T9	But it was also for senior primary. In my concern, it was not for junior primary.	
182	T5	We made a cool story.	
183	T9	We made wonderful stories, but I mean, our kids can't make stories. It's way beyond them.	story writing line 183
184		The Grade 3's we did, I did with my class after that lesson, and they really enjoyed it, but your time is limited.	time is limited line 184, 185
185		You do not have enough time to make a whole story because you need to first explain, by the time you've	need time to finish a lesson line 185-186, 188-189
186	T6	explained, the time's up. Then the next class has the iPads. So, it doesn't help even explaining, then they forgot...	
187	T9	And the following week they've forgotten it, and you've got to re-explain...	easier to put on kahoot becomes a waste not using it properly line 189-191
188		You need to re-explain. So, it's just... There're lovely things that you can do and that she taught us, but the time	
189		just doesn't allow it. That's how I feel. So, it's much easier just putting up a Kahoot!, quickly log on, do a Kahoot!	
190		and that's actually not what we're supposed to do. We need to do a bit more. Or you just tell them, "Go onto	
191	T6	this app. Do this app", and you walk around. That's all we can do because that's the time we've got.	
192	T5	I feel like that as well. I feel I'm not doing what I'm supposed to do now.	not doing what im suppose to line 192
193		If you didn't have such limited time, you can actually do those (things?), and you can actually create a story with	
194	T6	them and incorporate it into your creative writing and things like that. But we can't.	story writing line 193,194
195	T5	We don't have time	
196	T6	You don't have the iPads enough, and you don't have the time.	
197		And for me, we made stories on the computer and we split the class in half, but now again it's that time thing.	
198		So, now you can literally when you playback you hear the child that was sitting next to them's recording because	use the device as an assistive device when doing story writing
199		you're sitting so close and there's not enough hands or whatever. Whereas I think if they for example in speech	recording device , writing line 197-200
200		have to do story writing, it's a perfect opportunity to use the iPad because it's in a one-on-one setting. So, then	
201		they can actually, "Let's see how can we incorporate it" and in a sense that also helps us because then they're	reinforcement line 202
202		kind of teaching the kids as well, so it gets reinforced. And then we can (try?) the class, but we're kind of working	
203	T8	better as a team.	
204		I think they should all be in the class at the same time when we do story writing. OT, speech, (value?), analysis.	
205		You will get amazing stuff. And you can have an iPad, and you can actually make a story. I reckon they could do	ipads could be used with the multi disciplinary team to assist learners line 204-205
206	T5	it. I reckon they could go and take photographs of books. I don't think they are incapable.	
207	T6	You would need so much assistance.	
208		You would need one person to do a group work thing. One person to structure that. One person's working on	another person helping you line 208 and 209 , 207
209	T5	that and then work as a team. That would be amazing.	
210		Thank you so much for your time. I might need to come back and ask some more questions, but I'll let you know.	
211	DN	Thank you so much for your participation.	

## Interviews combined analysis

Interview 1	Interview 2	Interview 4	Interview 5	Summary of Themes
Analysis 2 basic themes	Analysis 2 basic themes	Analysis 2 basic themes	Analysis 2 basic themes	
Time period used	Time period used	Time period used	Time period used	Time Period is too short
lessons are 30-40 min once a week ( Line 6)	bit of a waste of time line 5		half an hour is not enough line 11 70	interview 1: line 6
	about 20 minutes and then for 10 minutes, line 10	too little time 30 mins line 48 and 50		interview 2: line 5, 10 and 14
	don't think there is enough to be quite honest. Line 14			interview 4: line 48 and 50
				interview 5: line 11 and 70
Used for	Used for	Used for	Used for	Used for
Used to consolidate concepts (Line 7)	literacy line 82	Academic enrichment line 14	maths and literacy line 33	Mathematics
Maths concepts (Line 11 and 16 and 18)	doubling , halving, symmetry line 7,8, 32	story retelling line 17	bonds line 37	interview 1: line 11 , 16 , 17,18
Concepts consolidation, time, place , value , money ( line 17)	blending sounds line 9 and 16	reinforcement line 33		interview 2: Line 7,8,32,22 and 23
Creative Writing (line 12)	sounds line 15			interview 5: 33
Literacy (Line 18)	bonds line 22 and 23			Literacy
				interview 1: Line 12 and 18
				interview 2: Line 82 , 9 , 16 ,15
				interview 4: Line 17
				Enhancement/ reinforcement
				interview 1 : line 7
				interview 4: line 14
Apps used and for what	Apps used and for what	Apps used and for what	Apps used and for what	Apps
Apps used Kahoots, (line 18 and 8)- gives both maths and literacy	puppet pals line 82 and 83	Kahoot line 19	Eggy maths line 36	Mathematics
Puppet pals- creative writing	Kahoot line 5 and 6 , 31 , 36, 40	Mathletics line 15	Lego App Line 5	Kahoots
Mathletics - maths (Line 9)	mathletics line 11	Puppet Pals lines 16 and 17 ,34	Kahoot line 7, 8, 9,11	interview 1: line 18 and 8
		Lego line 25	Purple mash line 23	interview 2: Line 5 , 6 , 36 ,40
			Eggy perceptual line 45	Mathletics
				interview 1: line 9
				interview 2: line 11
				interview 4: Line 15
				Eggy Maths
				interview 5: line 36
				Literacy
				Kahoots
				interview 1: line 18 and 8
				Puppet pals
				interview 1: Line 17
				interview 2: line 82 and 83
				interview 4: line 16 and 17 , 34
				Enhancement/ reinforcement / fun
				interview 4 : line 25

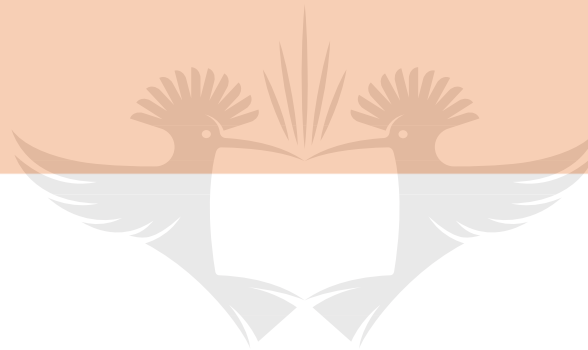
grade 1

				Interview 5: line 5
				Interview 5: line 23
				Interview 5 : line 45
<b>Identified learners</b>	<b>Identified learners</b>	<b>Identified learners</b>	<b>Identified learners</b>	<b>Identified learners</b>
there are adhd learners (line33 )	6 out of 10 learners in my class are ADHD	There are ADHD learners concentration better line 38	fun and they hold their concentration	there were ADHD learners
they enjoy it more than just normal , conventional , sittng -behind-the desk looking at the teacher typer of thinking. (line 36 and 37)	they love being able to read line 46			Interview 1: line 33
	because they present with reservs line 47			Interview 2 : line 44
helps anxious learners ( line 39)	makes them feel in control line 50			Interview 4 :Line38
				Concentration was better
				Interview 1: line 36 and 37
				Interview 4 :line 38
				Find It fun
				interview1: line 36 and 37
				interview 2: line 46
				Feel less anxious in control
				Interview 1: line 39
				interview 2: line 50
<b>Advantages of useage with these learners</b>	<b>Advantages of useage with these learners</b>	<b>Advantages of useage with these learners</b>	<b>Advantages of useage with these learners</b>	<b>Advantages</b>
more exciting (line 37)	play better and learn through play line 17 and 18	works as a reward line 46	Seen progress when they started at the beginning of the year they couldn't do them now they are able to play the game and get the answer right line 38-40	increased attention
catues attention (line 37)	learners are enthusiastic line 28	Concentration on the app is much better line 38		interview 1: line 37 ,40
they want to learn on an Ipad (line 38)				Interview 4: line 38
learn in a fun way (line 40 )				
				Learn in a fun way
				Interview 1: Line 40
				Interview 2: Line 17 and 18
				Interview 4: Line 46
				want to learn on an ipad
				interview 1: Line 38
				interview 2: line 28
				Progress in area previously diff
				Interview 5: line 38 -40
<b>Problems Identified with the Ipad usage</b>	<b>Problems Identified with the Ipad usage</b>	<b>Problems Identified with the Ipad usage</b>	<b>Problems Identified with the Ipad usage</b>	<b>Challenges</b>
Not enough time (line 13)	only use what trained in line 75 and 79	They cant log in themselves line 19	There isnt time to prep line 50	Not enough time to prep get to know apps
don't have own Ipads (line 14)	only use whats on the Ipad line 73	wastes time line 21	no time at school to look at apps line 51	Interview 1: Line 45 and 46
use the same apps all the time not enough apps (line 45) (line 46)	to young to copy codes off the board line 37 and 38	cant use mathletics line 22	no ipad at home you cant look at apps line 52	Interview 4: Line 49
don't have own Ipads (line 14) (line 47)	they just play line 12	ipads at the end of the day line 24 and 26	lost in big group training line 59	Interview 5 line 50 ,51
This is short (Line 7) (30-40 mmin lesson)	learners who dontlike Ipad line 29, 32,33	no time to prep and pre nees to be extensive line 49	Apps not adaquite line 17	Not enough time
not used to full potential could do more (line 24 ,25)			Wifi slow line 12	Interview 1: line 13, 7

not enhancing or making teaching better (line 29)			Kahoot creates frustration	
new to the school (line 30)			Don't think we have enough apps line 5,6	No Ipad
not seeing benefit currently (line 31)				interview 1: Line 14 , 47
				interview 5 line 52
				not enough training
				interview 2 : line 75 and 79
				interview 5 : line 59
				not enough apps
				Interview 2 : line 73
				interview 5 : line 5,6, 17
				learners who don't like ipads
				interview 2: line 29 , 32 , 33
				cant copy
				Interview 2 line 37 and 38
				Interview 4: line 19 , 22
				ipads at end of day
				Interview 4: line 24 and 26
				Just play
				interview 2 line 12
				Interview 4: line 21
				Wifi slow
				Interview 5 : line 12
There is potential	There is potential	There is potential	There is potential	The potential
can make a difference (line 46)		Playing a game and working line 39 and 40	Learning through fun line 41	Learn and have fun
not used to full potential could do more (line 24 ,25)	, voice record , reduce reversals line 52-60		There is a lot we can do line 13	Interview 4: line 39 and 40
	put their stories on , let them type line 52-60	beneficial to teaching line 26 and 27		believes it makes a difference
	benefit learner line 68			interview 1: line 46
				interview 2: line 68
				Interview 4: Line 26 and 27
<b>Suggested Solutions</b>	<b>Suggested Solutions</b>	<b>Suggested Solutions</b>	<b>Suggested Solutions</b>	<b>Suggested solutions</b>
Need more training (line 23)		Teachers need access before the lesson line 47	Could have done more training line 58	Training
Need more time with device to find apps (line 43 and 47)	Jumpstart line 19		more focus on specific phases line 65	interview 1: line 23
Need more apps (line 45)	more training line 84		2 periods a week would be nice line 68	interview 2 : line 84
	more time with an ipad line 77and 78		could do literacy and numeracy line 69	interview 5 : line 58 , 27,28, 31,32
	more time to look at apps line 69		teachers need get more knowledge on how to use the devices line 27 and 28 31,32	more apps and time to play on apps
	allowed to download apps and try them line 66		need more apps line 17	Interview 1 : line 45
				interview 2 : line 69 and 66
				interview 5 line 17



				Need time with device
				interview 1 :43 and 47
				interview 2 line 77 and 78
				interview 4: Line 47
				interview 5
				more focus on specific phases line 65
				2 periods a week would be nice line 68
				could do literacy and numracy line 69
This is short (Line 7) (30-40 mmin lesson)	. voice record , reduce reversals line 52-60		There is a lot we can do line 13	Asssitve technology
not used to full potential could do more (line 24 ,25)	put their stories on , let them type line 52-60			
not enhancing or makng teaching better (line 29)				
new to the school (line 30)				
not seeing benefit currently (line 31)				
can make a difference (line 46)				
not used to full potential could do more (line 24 ,25)				

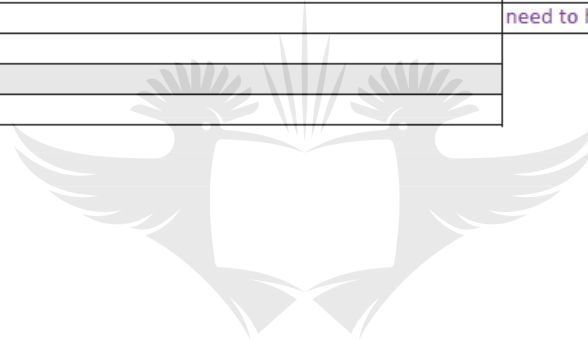


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## Focus group compare to interviews

Summary of Themes		
		Analysis 2 basic themes
<b>Time Period is too short</b>	<b>Focus Group support</b>	<b>Time period used</b>
Interview 1: line 6	FG : line 65 195,195 142, 143,184, 185, 144,150,148, 151	bit of a waste of time line 5
Interview 2: line 5, 10 and 14	<b>need time to finish lessons</b>	Time is a problem , need to play and plan an explore not time at school line 25 and 26
Interview 4: line 48 and 50	FG: Line 185-186, 188-189	we need time line 65 195,195 142, 143,184, 185, 144,150,148, 151
Interview 5: line 11 and 70		need time to finish a lesson line 185-186, 188-189
<b>Used for</b>		<b>Used for</b>
	<b>Mathematics</b>	Doubling halving
Interview 1: line 11 , 16 , 17,18	FG: line 77,76	maths line 77
Interview 2: Line 7,8,32,22 and 23		Plus minus line 76
Interview 5: 33		letter formation and tracing line 59
	<b>Literacy</b>	reinforcement line 60
Interview 1: Line 12 and 18	FG : line 59,75	verbs nouns adjectives line 75 (kahoots)
Interview 2: Line 82 , 9 , 16 ,15		reinforcement line 202
Interview 4: Line 17		<b>Apps used and for what</b>
	<b>Enhancement/ reinforcement</b>	Kahoot line 5, 75, 77 ,73,89
Interview 1 : line 7	FG: Line 202	Mathletics line 7, 42 , 43 , 44
Interview 4: line 14		
<b>Apps</b>		
	<b>Mathematics</b>	
<b>Kahoots</b>		
Interview 1: line 18 and 8		
Interview 2: Line 5 , 6 , 36 ,40		<b>Identified learners</b>
		some learners present with anxiety line 78,85,88
<b>Mathletics</b>		Spectrum kids become obsessive line 93,95,96,97
Interview 1: line 9	FG: Line 7, 42 , 43 , 44	they want to finish activity so that they can have free time line 98 and 99
Interview 2: line 11		
Interview 4: Line 15		personal for each child , why can others do this and they cant causes a ripple effect line 101-105
		need to have boundries in place line 101
<b>Eggy Maths</b>		
Interview 5: line 36		

Interview 4: line 19 , 22		some go fast some cant get in 146-148
		is it reaching full potentail no line 155,156
<b>Ipads at end of day</b>		no focus on the foundation phase 157-159
Interview 4: line 24 and 26		Computer teacher helps seniors with ipad lesson not in foundation phase line 176-181
<b>Just play</b>		easier to put on kahoot becomes a waste not using it properly line 189-191
interview 2 line 12		use the device as an assistive device when doing story writing
Interview 4: line 21		recording device , writing line 197-200
<b>Wifi slow</b>		not doing what im suppose to line 192
Interview 5 : line 12		need to have boundries in place line 101
<b>The potential</b>		
<b>Learn and have fun</b>		
Interview 4: line 39 and 40		
<b>believes it makes a difference</b>		
interview 1: line 46		
interview 2: line 68		
Interview 4: Line 26 and 27		



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Suggesed solutions	
<b>Training</b>	
interview 1: line 23	
interview 2 : line 84	
interview 5 : line 58 , 27,28, 31,32	
<b>more apps and time to play on apps</b>	
Interview 1 : line 45	
interview 2 : line 69 and 66	
interview 5 line 17	
<b>Need time with device</b>	
interview 1 :43 and 47	
interview 2 line 77 and 78	