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Teacher understanding and implementation of executive functions in Grade R

by

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Submitted in partial fulfilment of the requirements for the degree

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Co-supervisor: Prof M. G. Steyn

SEPTEMBER 2018

DECLARATION

I, Elsa Etokabeka, student number 10072022, hereby declare that this dissertation, **Teacher understanding and implementation of executive functions in Grade R,** is submitted in accordance with the requirements for the degree M.Ed. General at the University of Pretoria, is my own original work and has not previously been submitted by me for a degree at this or any other tertiary institution. All sources cited or quoted in this research paper are indicated and acknowledged with a comprehensive list of references.

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Elsa Etokabeka

30 September 2018

DEDICATION

I dedicate this research to my parents, Desire and Eunice, alongside my lovely sisters, Renicia, Laureat and Cynthia, and our latest addition, Kael David Ribeiro.

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DECLARATION

To whom it may concern

I hereby confirm that I have proofread and edited the language of the following dissertation, including the bibliography.

Title of dissertation

Teacher understanding and implementation of executive functions in
Grade R

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Elsa Marilise de Carvalho Etokabeka

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19 September 2018

ABSTRACT

South Africa currently has many learners commencing formal schooling without the necessary cognitive or behavioural skills. Research attributes this to weak executive functions, which can be understood as cognitive and behavioural skills that enable the ability to plan, pay attention, follow instructions and handle multiple tasks. Furthermore, executive functions consist of self-regulation, working memory and cognitive flexibility that permit people to work towards their goals. The development of these functions is necessary for reasoning, problem solving and planning as they encompass higher cognitive skills needed for schooling adjustment and academic success.

Hence, the focus of this study is centred on exploring teachers' understanding and implementation of executive functions in Grade R. The study consisted of eight Grade R teachers from different schools who shared their meanings and interpretations of this term. Furthermore, the study employed a case study design to explain the teachers' understanding of the concept and illuminate how executive functions are implemented within lessons. Lastly, I gathered my data from different sources, which included semi-structured interviews and observations of teachers.

Taken together, the findings of this study indicate that teachers' perceptions of executive functions are detailed according to cognitive and behavioural skills. Furthermore, the study also identifies challenges that Grade R teachers experience when they develop executive functions and the positive attributes that enhance this skill during lessons; these are all discussed under the themes and categories detailed in the analysis and findings of this work.

Key terms
School readiness, executive functions, Grade R

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LIST OF ABBREVIATIONS

CF	Cognitive flexibility
EF	Executive function
N/A	Not applicable
SF	Self-regulation
WM	Working memory

CHAPTER 1

INTRODUCTION AND ORIENTATION

1.1   INTRODUCTION

School readiness can be defined as a set of behavioural, social and cognitive skills that are required for the formal school environment (Commodari, 2013). Certain skills are, therefore, needed for a learner to be school-ready. According to Samuels, Tournaki, Blackman and Zilinksi (2016:478), executive functioning predicts academic achievement and are, hence, the building blocks for successful adaptation in the formal school situation. They furthermore define executive functions as mental controlling forces that enable individuals to direct their thoughts, behaviour and attention to attain any goal. When at school, for example, an organised mind facilitates learners' ability to acquire knowledge, which is particularly important for school readiness. In a study conducted by the Center on the Developing Child at Harvard University, its report, "Working Paper on Executive Functions" (Harvard University, 2011), has revealed that cognitive skills enable learners to read and write, take part in classroom discussions, and remember the required steps to complete a task. Hence, Blair (2002:113) postulates that these "cognitive skills form the basis for self-regulated learning generally referred to as executive or meta cognitive [sic] skills" because most of these traits encapsulate planning, working memory, attention and self-regulation.

Currently, numerous learners of school-going age are not ready for formal education (Bruwer, Hartell & Steyn, 2014). Van Zyl (2012:34) warns that these learners stand a great chance of struggling to adjust, which will ultimately affect their academic performance. Thus, to prevent this problem from occurring, learners need to commence school with the essential skills for their schooling careers. It is important that teachers develop executive functions during Grade R to ensure that learners are prepared for formal education. Education during the early years of schooling is pivotal to establish a solid foundation, as this marks a continuous pattern from which a child draws its skills to grasp knowledge and learning (Fitzpatrick, 2014). Furthermore, learners "need to acquire cognitive and meta-cognitive skills and strategies such as reasoning, decision-making, problem-solving, categorizing, evaluating, reflecting and creating" to be ready for school (Esterhuizen, 2012:36).

Executive functions would improve the cognitive development of young learners prior to beginning formal education, which is Grade 1 (Esterhuizen, 2012). This study will explore how teachers understand executive functioning and the methods of developing executive functioning skills in Grade R. One of the objectives of this is to enhance school readiness in formal education.

1.2   RATIONALE

It is important for a Grade R teacher to pay attention to the development of executive functions to ensure that the learner can make decisions, solve problems and control impulsive behaviour – this can be referred to as self-regulated behaviour (Singer & Bashir, 1999). Sasser, Beekman and Bierman (2015:682) acknowledge the importance of self-regulated learning when they assert that for a child to function optimally in a school environment, certain cognitive abilities should be in place, such as independence, retaining information when the teacher gives instructions and constructing the meaning of knowledge through social-related play.

Although I have only been teaching for a year, I have noted that little time is being spent on fostering the development of executive functions in learners. It is obvious that learners struggle to solve problems or make decisions on a day-to-day basis. For example, one of my learners displayed a lack of executive functions through the following actions: when picking a toy from the shelf, she would take all the toys and hold everything until they start to fall because she is unable to pick one specific toy to play with. The same learner also cannot control her behaviour in class and frequently stands up during a lesson to tell a story or ask a question, thereby disregarding rules and specific commands. I have also come across learners who cannot control their concentration span, resulting in incomplete work; they also find it difficult to set goals for themselves. Some learners struggle to control their emotions when they are angry or frustrated and then lash out, thereby demonstrating unacceptable social behaviour. Through experience, I have noticed that scant attention is given to rectify this behaviour, and usually the learner is just punished or scolded. I, therefore, suspect that teachers are not aware that this kind of behaviour is due to a lack of executive functions, and that these functions can be developed in children.

In my literature review, I have only found American studies that have been conducted on the development of executive functioning in six-year-old children (Diamond, Burnett, Thomas & Munro, 2007), but none relates specifically to the pre-school child in South Africa. Hence, my study will address this contextual gap. Furthermore, focusing on the Grade R teacher is purposely designed to address this gap.

By using the data from my study, teachers who are not aware of the impact that cognitive development has on school readiness can be guided to improve their teaching strategies to support their learners. I sought to investigate the nature and importance of executive functioning, as well as how it assists learners to succeed academically by developing metacognition (Levine & Munsch, 2016 and Snowman & McCown, 2011). The knowledge gained from my study is aimed at improving school readiness, implementing different teaching approaches and developing working policies for educators; this is particularly to help learners from poorer backgrounds to adapt better at school and academically thrive therein.

1.3   PROBLEM STATEMENT

The throughput rate in the South African school system attests to the thousands of learners who enter Grade 1 but drop out during their school career. According to Spaull's (2014) simplified calculations, of every 100 learners who began schooling, only 51 successfully passed until matric in the year 2013. Furthermore, only 16 out of each 40 learners obtained the means to enrol at a university. Bruwer et al. (2014:23), mention that one of the causes of negative school performance is associated with insufficient learning experience caused by poverty and environmental constraints. It is the opinion of Snowman and McCown (2011) that the failure to perform academically is the result of an inadequate foundation in metacognition; they explain it to be a deficit in the skill of encoding, storing and applying schemas of learning contexts. Consequently, when information is not stored meaningfully, it becomes inapplicable to the learner and he or she hence fails to thrive academically (Snowman & McCown, 2011).

The importance of honing executive functions in the early years is emphasised by Best and Miller (2010). They state that the components of executive functions are already evident within the first year of life, although most of the development thereof

only takes place during the preschool years. Esterhuizen (2012:72) asserts that it is the task of both the teacher and the parents to develop executive functions by providing "intellectual stimulation, emotional well-being, a supportive learning environment, encouraging self-discipline, setting boundaries and realistic goals." Moreover, parents and teachers can formulate tasks that may enable learners to succeed academically. Although preschool teachers may subconsciously address the development of executive functioning, Snowman and McCown (2011) emphasise how, currently, preschools have not yet formally developed interventions to assist with the training of executive functions. Furthermore, the authors point out that supporting teachers to develop executive functions in learners is a matter that does not receive much attention (Snowman & McCown, 2011). Thus, the problem presented has provided the ideas according to which my research questions could be structured.

The research questions that guided my study are set out below.

1.3.1 Main research question

What are teachers' understanding and implementation of executive functions in Grade R?

1.3.2 Secondary research questions

- Why are executive functions important for school readiness?
- What are some of the cognitive and behavioural challenges that teachers experience during lessons?
- How can teachers develop executive functions during lessons?

1.3.3 Aims of the study

The aims of this study are, therefore:

- to explore teachers' understanding and implementation of executive functions in Grade R;
- to determine why executive functions are important for school readiness;
- to identify the cognitive and behavioural challenges Grade R learners struggle with; and

- to examine different ways by which teachers can develop executive functions during lessons.

1.4   CONCEPT CLARIFICATION

For the purpose of my study, the following concepts will be explained:

- School readiness
- Executive functions
- Grade R

1.4.1   School readiness

According to Fitzpatrick (2014:2), school readiness pertains to the cognitive capacity that learners are required to have in order to cope with learning demands in the school environment. "In particular, school readiness involves the prerequisites of reading, writing, and arithmetic skills, the ability to manage emotions and handle stress without a breakdown, and the ability to co-operate with others" (Commodari, 2013:125). De Witt and Booysen (2007:156-157) add that school readiness implies that a learner should be able to adapt effectively to the formal learning environment (Grade 1) without emotional perturbation or learning difficulty in the classroom.

Van Zyl (2012:35), on the other hand, explains that school readiness includes different levels of development, namely emotional development, cognitive development, physical-motor development and affective-social development, as well as cultural, situational and literacy readiness. Van Zyl (2012:35) adds that school readiness requires learners to be able to acquire perceptual and conceptual skills such as visual and auditory discrimination. It is necessary to master these skills in order to effectively understand and arrange information, develop memory and acquire problem-solving skills. Consequently, school readiness does not focus on only cognitive and literacy skills but also the multidimensional cognitive system that involves all the developmental learning areas and skills of learners (Sahin, Sak & Tuncer, 2013).

For the purpose of my study, "school readiness" will refer to the level of readiness required when entering the formal education environment. In South Africa, Grade 1

is the first year of formal education. A summary of the criteria for school readiness is presented in Figure 1.1.
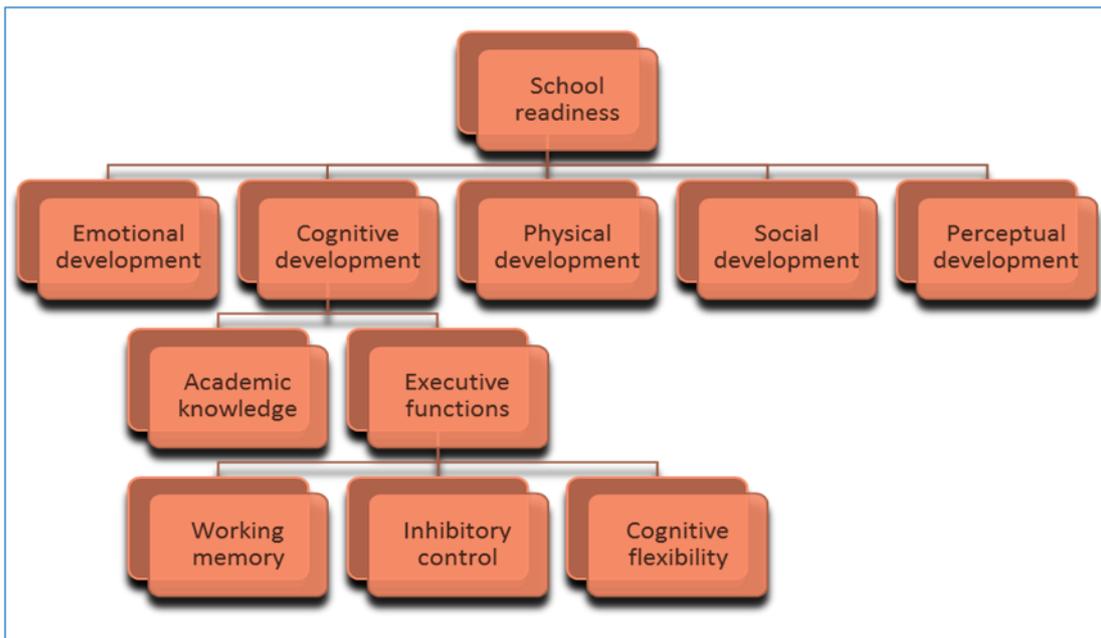
Figure 1.1:   Criteria for school readiness
Source: (Bierman, Nix, Greenberg, Blair & Domitrovich, 2008)

Figure 1.1 represents the different elements of school readiness; however, for the purpose of my study, only the last three factors will receive attention, as these encompass executive functions.

1.4.2   Executive functions

According to Sasser et al. (2015), executive functions are a set of cognitive functions that are crucial for successful adaptation in a classroom. The executive functions consist of working memory, inhibitory control and cognitive or mental flexibility. These three components work together to produce skilled cognitive working functioning (Harvard University, 2011:2). Working memory, for example, is the ability to remember and control information in one's mind. It enables the learner to continue with a task after it has been interrupted, to recall addresses or telephone numbers and to remember what has been read in a previous paragraph. Inhibitory control, on the other hand, refers to the ability to control impulses. It helps the learner to prioritise and to think before acting, and restrains impulsive behaviour. It is the skill that learners rely on the most to wait for their turn or to ignore distractions during lessons, and even to finish whatever activity they are busy with (Harvard University,

2011:2). Furthermore, the inhibitory control is important because it helps learners to think before speaking their mind; for instance, in a situation where they see that somebody is fat, their inhibitory control assists them to keep quiet rather than to voice comments out loud. Because it revises information, the inhibitory control acts as an inner voice (Harvard University, 2011:2). Lastly, cognitive or mental flexibility assists a learner to apply different rules in different situations (Barak & Levenberg, 2016:40).

Being the prime cognitive regulator, the cognitive function automatically controls other functions and behaviours. According to Sharples (n.d.), executive functions go hand in hand with social behaviours, such as understanding how others see one, being sensitive towards others, or even being deceitful. Executive functioning is seen as the ability to control ideas and conduct the necessary measures to respond effectively to the environment. Sharples (n.d.:1) further accentuates that –

> … the frontal regions of the brain that play a role in all executive functions are available to make new associations, engage in planning, make decisions and inhibit impulses – these are mental processes that free an organism from responding only to an immediate situation.

Thus, executive functions enable learners to examine that which they want, the measures taken to obtain it, the execution of their plan of action and effectively carrying out the act on other occasions (Sharples, n.d:1).

In my study, "executive functions" will refer to the ability of the Grade R learner to control his or her own behaviour owing to well-developed self-regulating skills. Furthermore, it will involve how a learner may regard changing priorities, demands and his or her perspectives. Ultimately, executive functions will allow the learner to hold and manipulate information such as following instructions, paying attention in class and avoiding impulsive behaviour.

1.4.3   Grade R

In South Africa, Grade R is regarded as the first year of the Foundation Phase, although it is not compulsory. "Foundation Phase" refers to Grades R to three, of which Grades 1 to 3 are compulsory. Grade R is, therefore, the year before the first compulsory year of formal education. In the United States of America, the term

"kindergarten" is comparable to Grade R in South Africa. Esterhuizen and Grosser (2014:112) highlight the importance of early learning in preschool because it establishes the foundation of learning and enable learners to achieve academic success.

1.5 LITERATURE REVIEW

In this section, some works of literature will be presented to illuminate the context of the study. In Chapter 2 however, more attention will be paid to the aspects that are only briefly discussed here.

Studies note that many learners who are struggling to cope with learning demands at school have challenges related to literacy and passing mathematics (Spaull, 2013 and Spaull & Kotze, 2015). Rademeyer (2008) ascribes these challenges to children being ill-prepared for formal learning. Sasser et al. (2015:681), state that the inability to adjust to or function at school is often the result of a lack of attention and behavioural problems that are commonly rooted in cognitive and behavioural weaknesses. Hence, when children commence with formal education without cognitive and behavioural skills, their capacity to learn effectively is compromised (Esterhuizen, 2014:112 and Van Rensburg, 2015:3).

Furthermore, literature highlights the various studies that address the topic of preparation for formal learning. Shaul and Schwartz (2014:751), for example, emphasise the importance of preparing learners for the learning and social demands they will be confronted with at school. Having this in mind, Harvard University (2011:5) explains that "executive function skills are the common denominators required for both learning and social interaction." These cognitive and behavioural skills play a significant role in learning because they assist learners to adjust to and function effectively at school. A few of the skills that permit children to adjust effectively are the abilities to plan, to organise and to manage one's work or behaviour at school – and executive functions encompass these abilities (Meltzer, 2010:3).

Hence, the following topics will be explored to illuminate the topic of executive functions: school readiness, the cognitive readiness of a learner, the impact that executive functioning has on learning, and lastly, the effects of poverty on school

readiness. By exploring all of these angles, the study will seek to determine the role of the Grade R teachers in developing executive functions.

1.5.1   School readiness

According to Mashburn and Pianta (2006:152), school readiness can be understood as to how a learner can effectively engage independently in the social environment. Furthermore, it entails the cognitive ability to master learning tasks, and when applied to the general mass, it refers to the age at which the average individual has the specified capacity to be taught (Lewit & Baker, 1995:128). According to McEwan-Adkins (1990), school readiness may be developed through interactions such as the social relationships between children and their parents, between the parents and the teacher, or between the teacher and the learner. Having strengthened relationships among all three parties, the child's motivation and interests in learning are increased, thereby ultimately enabling school readiness (Mashburn & Pianta, 2006:152).

The importance of school readiness in the Foundation Phase, particularly the transition from Grade R to Grade 1, cannot be overemphasised (Esterhuizen & Grosser, 2014). Fitzpatrick (2014:157) affirms that school readiness is of utmost importance when adapting to formal learning because it prevents poor academic achievement, which can further cause learners to drop out of school, become unemployed, engage in delinquent activities and even contract health problems. Thus, school readiness is deemed to be advantageous for a country because it minimises the chances of a society contracting social ills, and it equips learners with a head start opportunity to engage better in learning. If children participate in early learning, it enhances their ability to succeed academically (Shaul & Schwartz, 2014:753). Van Zyl (2012:36) suggests that because preschools influence the quality of education, this ultimately determines successful school performance. However, there are always external factors, especially for learners from low socio-economic backgrounds, that may have a negative effect on these learners' ability to learn.

Esterhuizen (2012:64) holds that young learners are intensely and actively engaged in learning during their pre-school years. At an early age, children attain pre-academic skills through surrounding contexts that emit knowledge and information;

this slowly creates a learning pattern to acquire knowledge (Esterhuizen, 2012:64). The pre-school years set the foundation on which learners build their learning for the future. It is, therefore, necessary that learners receive quality education taught by knowledgeable teachers to ensure academic success for the learner. Several factors that enable cognitive stimulation exist, including "visual skills, auditory skills, attention, expanding memory, thinking skills, and language usage … [which] are all acquired during the pre-school years" (Esterhuizen, 2012:67). Hence, in developing executive functions in Grade R, these factors would serve as a solid base in establishing the early learning skills.

In America, the National Education Goals Panel was founded in July 1990 to monitor the eight educational goals laid down for the nation to attain (Emig, 2000:1). Emig (2000) elaborates by saying that one of the first goals from the year 2000 was that all children in America should start formal education already having basic learning skills. The National Education Goals Panel addressed this important goal and identified the three main components of school readiness: the readiness of the learner to adapt and participate in formal education; the readiness of the school for learners, where teachers are equipped to assist and support learners; and a stable foundation that consists of family and the community to offer support and services to contribute to school readiness (Copple, 1997). Within the South African context, Emig's (2000) theory is parallel to De Witt and Booysen's (2007:156-157) outlook, where they mention that school readiness implies that a learner can adapt successfully to formal education without emotional disturbances or learning difficulties in the classroom. Hence, it is noticeable from both American and South African studies that certain skills are needed to equip learners for formal education. Fitzpatrick (2014:157) states that the advantages of preparing learners with formal education are that the learners' academic proficiency is increased and they are guided to handle challenges dealt with throughout their educational journey. This ultimately applies cognitive functionality to enable learning readiness.

1.5.2   Cognitive development

Cognitive development is a mental process that guides a learner to acquire, understand and modify information, including all mental activities such as conceptualising, perceiving, sensing, classifying, reasoning, categorising,

remembering, problem solving and symbolising (Esterhuizen, 2012) – hence, to be cognitively ready, one would need to co-ordinate one's cognitive function logically.

Bierman, Torres, Domitrovich, Welsh and Gest (2008:309) state that there are two distinct aspects of cognitive readiness that are regarded as important –

> … one involves the academic knowledge that represents a proximal antecedent of early achievements in the domains of emergent literacy and emergent mathematics, and the other involves more fluid cognitive reasoning skills – the executive function skills that provide a foundation for reasoning and problem solving (Bierman et al., 2008:309).

According to Salthouse (2005:532), executive functioning has been assumed to be responsible for cognitive abilities and flexivity, which are very important for the study of neuropsychology.

Esterhuizen (2012) refers to Piaget (1956), who argued that cognitive development is a repetitive process where children grasp certain thoughts at a time in life. Piaget (1956, in Esterhuizen, 2012) further postulated that children might show evidence of more than one stage simultaneously, but progress cannot continue to the next level of their development before they are ready. Alloway, Gathercole, Willis and Adams (2004:84) claim that there are several cognitive skills that contribute to school readiness. Cognitive skills are "the ability to encode, access, and manipulate the sound units of language" Alloway et al. (2004:84), and these skills contribute to the learner's ability to acquire language skills – the ability to communicate effectively. Bierman et al. (2009), furthermore note that a learner's classroom participation increases his or her cognitive development; thus, the information that a learner acquires in class depends on the attention span of the learner. According to Van Zyl (2012:36), attention span forms a very important part of cognitive skills, and the length of time the learner can pay attention is a determining factor for learning and school readiness. The attention span forms part of the working memory within executive functions.

In executive functions, the working memory, inhibitory control and cognitive flexibility are the three dimensions that interplay with cognitive abilities (Harvard University, 2011:2). Looking particularly at the working memory, it works as a storage

compartment that retains and assists with the manipulation of information. As the working memory operates through the form of memorising and utilising information, it consists of the same traits when learning. Alloway et al. (2004:86), have found an interactive link between memory and learning. Thus, to understand the cognitive system for learning and school readiness better, one would need to study the working memory and learning abilities thoroughly, because "working memory measures the point at which a learner enters formal education – this being the acquisition and development of scholastic abilities …. It requires a theoretical understanding of the cognitive systems" (Alloway et al., 2004:86).

1.5.3   The impact executive functions have on learning

The "Working Paper on Executive Functions" (Harvard University, 2011:1) defines executive funcions as follows:

> … a group of skills that helps us to focus on multiple streams of information at the same time, monitor errors, make decisions in light of available information, revise plans as necessary, and resist the urge to let frustration lead hasty actions.

Executive functions play an important role in both the learner's cognitive development and functioning, and the learner's social interaction and emotional and behavioural control, which develop from childhood throughout adolescence (Anderson, 2002:72). According to Anderson (2002:71), the processes associated with executive functions include identifying goals, thinking flexibly, planning, self-regulating, anticipating, deploying attention, initiating activities and analysing oneself. These components are highly useful because they enable a learner to adapt effectively to a school environment and enhance the chance of the learner to succeed academically; thus, the presence of executive functions permits successful learning.

The literature, however, notes that school readiness involves both internal and external factors. The internal factors include executive functions because these deal with the factors found in oneself, for example one's working memory and cognitive flexibility. The external factors, however, are more exterior factors, such as monetary funds and learning materials that permit cognitive development to occur

(Commodari, 2013 and De Witt & Booysen, 2007). Unfortunately, poverty is one of the hindering forces that obstruct mental development owing to the deprivation of stimulation, working materials and the environmental exposure that would have fostered the culture of learning.

Consequently, to understand any basis of research, a theoretical framework provides an existing scientific reference. This provides the opportunity to show the grounds on which the research is developed and from what stance the research can further be undertaken. To understand the formation and influence of executive functions, one needs a scientific basis that details how the phenomenon operates (Vithal & Jansen, 2008:17).

1.6   THEORETICAL FRAMEWORK

A theoretical framework is a set of interrelated constructs that present a systematic view of a phenomenon or the manipulation of categories and the relationships among them (Anfara & Mertz, 2014). In short, a theoretical framework is used to explain and clarify a phenomenon, giving a different perception of the world and how it works. Hence, the use of Vygotsky's theory will be at the centre of the theoretical framework of my study as this theory focuses on the adult scaffolding the child to acquire knowledge and skills (Vygotsky, 1986).

Children cannot learn the principles of developing executive functions on their own; a facilitator is a bridging force between the known and the unknown. Vygotsky's sociocultural theory, for example, theorised that adults are the guides who foster beliefs, customs and skills in children development (Louis, 2009). Vygotsky mentioned that children "learn a new skill by the adult who models and structures the learning experience" (in Louw & Louw, 2007:26-27) – this is identified as the Zone of Proximal Development. Figure 1.2 explains the role of the teacher in assisting the learner to develop executive functions.
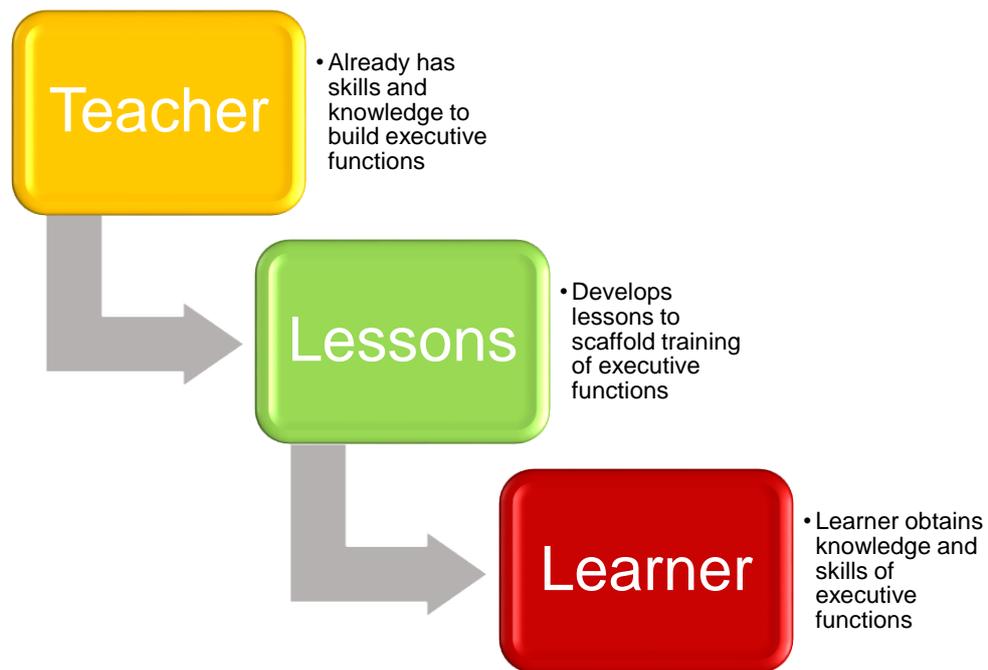
Figure 1.2:   The framework of Vygotsky's sociocultural theory, as adapted in my study
Source: Snowman & McCown (2011)

Thus, when learners are developing their executive functions, the teacher serves as the medium who trains the learners in developing their executive functions. The teacher, in this case, would need to know all the components of the executive functions, so they themselves would know what to develop and how. It is worth noting that, for a technique to be mastered, it needs to be modelled through attainable steps that learners can grasp (Veraksa, Shiyan, Shiyan, Pramling & Pramling-Samuelsson, 2016).

My study is based on investigating the way in which teachers in Grade R understand and implement executive functioning in early childhood education. Thus, the theoretical framework should guide the study in understanding what knowledge teachers have of executive functions and how they implement these in lessons. Teachers are the primary holders of the knowledge of executive functions; hence, they are the ones who train or scaffold learners in acquiring such skills. Executive functioning includes the skill to organise and structure information through cognitive interaction, and it transpires as the learning acquisition that occurs in the brain. Hence, the theoretical framework of my study will be that of Vygotsky's sociocultural theory. The framework acts as a mediating bridge that develops executive functions in learners.

1.7 RESEARCH METHODOLOGY

"Research methodology" is defined as the steps a researcher takes to conduct his or her study. The research methodology debriefs how the researcher plans on gathering information to provide evidence that will either support, refute, or conclude a new theory in the investigation (Creswell, 2014:3). Leedy and Ormrod (2014:7) further accentuate that "the research methodology is the general approach the researcher takes in carrying out the research project [and] directs the whole research endeavour." The two main functions of the research methodology include the collection of data and examining the data collection to obtain meaning from it. According to Leedy and Ormrod (2014:4), the research methodology also consists of both the research design (the overall view of how the study aims to address the research problem) and the research methods (its overall collection plan).

1.7.1 Research design

A research design is a strategy that the researcher uses to determine what number and type of participants will be needed, what data-gathering techniques will be used and how the data analysis will be done (Creswell, 2016:153). Leedy and Ormrod (2014:76) mention that the planning of the research study further illustrates how the information will be gathered and thoroughly inspected, which allows the researcher to have focus. The advantage of having a focus in research allows the study to be well organised and concise. A research design consists of a research paradigm, a research approach and a research type, which will be explained below.

1.7.2 Research paradigm

According to Thomas (2010), a paradigm is defined as a frame that sketches the views of one's belief, thus the manner in which people construct the understanding of their realities. The paradigm I will utilise in my study is the interpretive paradigm. Owing to seeking to understand teachers' perceptions of executive functioning, the interpretive paradigm provides the platform for the participants to share their own constructed meaning (cf. Cohen, Manion & Morrison, 2011:17). Thomas (2010) mentions that when aiming to interpret personal experience in the participants' living contexts, this form of gathering knowledge would be through a subjective angle. Maree (2016:62) further accentuates that with interpretive research, "the aim is to offer the perspective of a situation and analyse the situation to provide insight how

the particular group makes sense of the phenomenon they encounter." In my study, I have selected to use the qualitative design method because I intend to find different perspectives relating to executive functions. Aligned to this point of view, qualitative research emphasises the quality of perception in the natural setting and probes for a deeper understanding of a phenomenon (Creswell, 2016:6).

1.7.3   Research approach

In my study, I will be using a qualitative research approach. According to Thomas (2011), a qualitative research approach enables the researcher to understand the participants' points of view of a matter and how they would describe this phenomenon. Qualitative research thus assists the researcher in understanding the participants' own assumptions, attitudes and beliefs regarding a specific phenomenon (Marshall & Rossman, 2016:2-3). The aim of my study is to understand teachers' perceptions of the development of executive functions in Grade R. I planned on collecting data that could explain how executive functions are implemented and used in preschool education and learning. With the use of the qualitative research method, I would be able to gather data that would help to explain how teachers understand, introduce and sustain executive functioning.

1.7.3.1   Research type

My study will make use of a case study to explore how teachers assist Grade R learners in the development of executive functions. Creswell (2014:14) suggests that case studies are used when a study seeks to understand how participants interact with one another to obtain meaning of a certain phenomenon. Thomas (2011:10) describes the case study as "an in-depth exploration from multiple perspectives of the complexity and uniqueness of a project, policy, institution, programme or system in a 'real life' context." Hence, I chose to use this research type because I want to gain a deeper understanding of teachers' experiences regarding the development of their learners' executive functions in Grade R.

Maree (2016:81) furthermore asserts that a case study strives to obtain a holistic understanding of how participants respond to a specific situation in their environment, how they make meaning of a certain situation and how they interact with others. The justification for the use of a case study in this research is that it has

enabled me to understand how teachers incorporate and respond to the executive functioning, to investigate their methods and training and to explore how Grade R teachers view how they serve to enhance executive functions. The study aims to determine how teachers develop their own meanings and overcome learning problems in establishing executive functions in lessons. I planned to interview eight Grade R teachers from four urban preschools in Pretoria.

1.7.4 Research methods

1.7.4.1 Participants

Marshall and Rossman (2016:113) state that qualitative research is formed, based on purposive sampling when recruiting participants. Purposive sampling indicates that the researcher will choose participants who are identified as holders of specific data and could assist with addressing the research problem (Creswell, 2016:109).

Consequently, the participants for my empirical study were included based on the following criteria: they are Grade R teachers who have degrees or diplomas in teaching (BEd or DipEd). Secondly, the participants must have taught in different schools, particularly in the Foundation Phase, for more than four years; the period of four years is important with regard to the knowledge and experience teachers would have gained from working with and developing Grade R learners in this period. Thus, eight teachers in total from four private schools in urban Pretoria were interviewed. Having selected the various participants, I hoped that their teaching experiences would provide rich information that would be useful for the study.

1.7.4.2 Research site

I used convenience sampling to select the schools because several preschools are found in central Pretoria; these schools were mostly both primary and high schools. Since the schools were situated close to where I reside, it facilitated my ability to access the schools. Hence, four private schools in urban Pretoria were selected as the research site.

1.7.4.3 Role of the researcher

In qualitative research, during the data-gathering process, the researcher is often seen as the instrument used to collect the data (Marshall & Rossman, 2016:119).

As such, the researcher adopts the role of interviewer and analyser. The research role includes preparing, structuring and conducting the interviews. In the study, I took on the role of researcher to gather the data.

1.7.5 Data collection

Data collection techniques are defined as approaches, designs and instruments used to gather information about a study; the information obtained analyses the phenomenon of the study (Creswell, 2016:153 and Sani, 2013:40). Sani (2013:40) states that the analysis of a phenomenon through the means of data collecting "allows the researcher to systematically collect information about their object of study (people, objects, phenomena) and about the setting they occur." The data collection techniques I implemented in my study include semi-structured interviews and lesson observations.

1.7.5.1 Semi-structured interviews

According to Creswell (2016:127), interviews assist the researcher to encourage the interviewees to discuss the perceptions they have of the world in which they live, and to put into words what their lifeworld is like from their own point of view. Corbin and Strauss (2015:39) add that semi-structured interviews "enable researchers to maintain some consistency over the concepts that are covered in each interview." The reason for my using semi-structured interviews as a data collection method was to ask specific questions about teaching in Grade R and to give the participants the chance to explain their perceptions on the development of executive functions in their learners. The teachers had a pre-informative session before I commenced with the interviews in order to clarify their understanding of executive functions. Furthermore, the participants were interviewed once and individually. I asked permission to make use of a voice recorder while I took notes during the interviews. From these, I then completed my data analysis.

1.7.5.2 Lesson observation

Lesson observation is defined as the process of studying participants in their natural environment (Seabi, 2012:91). This data collection technique was necessary for my study because it allowed me to note how executive functions are implemented in lesson activities (cf. Creswell, 2016:117). Furthermore, lesson observation adds to

the information that queries what teachers understand executive functions to be, and in what form these are brought into the classroom. For my study, I observed a lesson of the participants for a period of three hours. By observing the teachers and learners during the lesson, I had the opportunity to compare the different techniques utilised by teachers to determine if they have similar or different experiences. The learners were also being observed to determine how they responded towards the lesson and to identify which of the executive functioning skills they struggled with most. By observing the teachers and the learners, I was able to note the unique styles that developed executive skills. The lesson observation took place after the interviews had been conducted. I made use of the facilities of the school to gather the data to ensure that my interviewees were comfortable with the surroundings when they answered my questions.

In the observations, I also made use of field notes to assist me with the description and reflection of the events. According to Creswell (2016:118, 121-122), field notes are a useful tool that forms part of the observation procedure because it guides the researcher to identify the required data, to remain focused throughout the course of observing, and to reflect meaningfully on unique experiences of the event.

1.7.5.3   Data analysis

Flick (2014) states that the researcher should bear in mind that data analysis can only commence once the data have been obtained. This allows for the processing of the information to be facilitated. Flick (2014) states that there are several stages in the analysis where one would first have to define terminologies, categorise them per codes and later interpret what this codification (information) means. Consequently, I analysed the data I had obtained from the participants through the recorded interviews and noted down the information from my lesson observations.

Once the semi-structured interviews and lesson observations had been completed, I could start the data analysis by gathering all my sources. I prepared the data for analysis by classifying and categorising the different themes that came to the fore when I transcribed the data from the audio recordings and notes (cf. Creswell, 2016:152-153). Categories of the data were then ordered into units and saved as computer files. The data were also categorised and grouped like the interviews. These categories were then linked to the practical issues of the study. My aim was

to answer the research questions with the data that had been gathered from the participants.

Erisen, Erisen and Ozekececi-Taner (2013:23) define content analysis as "the systematic, replicable method used for inferring meaning from data sources into fewer content categories based on explicit rules of coding." This calls for the researcher to reflect critically on the means of data obtained from the study and, thus, interpret what the gathered information means and could pose for the study. Leedy and Ormrod (2014:150) state that the next step in analysing data is to find themes and patterns. With the analysis of the data, new theories may possibly be developed from the research study (Twinning, Heller, Nussbaum & Tsai, 2016). When a new theory is developed from the analysis of data, this technique is regarded to be inductive analysis. I utilised an inductive approach in my study because it provided room for newly built explanations regarding a phenomenon (cf. Leedy & Ormrod, 2014:18).

1.8   TRUSTWORTHINESS

Marshall and Rossman (2016:44) state that the most critical part of data analysis and validating the findings is to determine the trustworthiness thereof. The four components of trustworthiness are transferability, credibility, dependability and confirmability. I will briefly discuss how I have adhered to these aspects in the study.

Guba (1981) mentions that the inductive process research findings undergo, works to ensure the value of the study is both identified and captured. In any qualitative study, measures are put in place to ensure the study is refined to produce the best outcomes from the data gathered. My study process includes credibility, transferability, dependability and conformability (cf. Shenton, 2004). Both credibility and transferability identify the internal and external validity of a study, and dependability and confirmability address the reliability and objectivity of the results (Guba, 1981 and Shenton, 2004).

1.8.1   Credibility

Beginning with credibility, Corbin and Strauss (2015:343) state that credibility seeks to ensure that the information gathered in the study is honest in evoking truth. Various sources need to be utilised to demonstrate the analysis of all angles in

obtaining depth towards its truth; this would show how the information can be trusted because it entails an open platform that includes various perspectives (Anney, 2014). For my study, I utilised two sources to gather knowledge, which included the use of interviews and lesson observation. This enabled my study to obtain different forms of knowledge that addresses the research question and identify possible solutions thereto.

1.8.2   Transferability

The second component of trustworthiness is transferability. Transferability in qualitative research mirrors external validity in quantitative research (Creswell, 2016:190-191). When conducting a research study, the primary goal in acquiring knowledge is to distribute the knowledge obtained thus. Any new information gathered should also be of use to others (Marshall & Rossman, 2016:47). The outcomes found in a study should also be applicable to the public mass (Leedy & Ormrod, 2014:78). In ensuring transferability of my study, I provided a thorough description of the participants: who had participated in the study and how they had been sampled; the research site; and a description of why they fit my study. This description will provide room for anyone interested in transferring the outcomes of my study to similar contexts.

1.8.3   Dependability

The third aspect of trustworthiness is dependability, also known as reliability in quantitative research (Corbin & Strauss, 2015:342). Dependability ensures that the results produced from the study are consistent and do not vary when conducted at various times. When the data provide the same outcome over time, the findings are then most likely to be trusted (Marshall & Rossman, 2016:262). I utilised an audit trail to show the study methods I had used to ensure the ability to replicate the same results (cf. Creswell, 2016:192). Secondly, I made use of various participants in my study from different schools. This was to assess how different participants respond in different settings.

1.8.4   Conformability

The final component of trustworthiness is confirmability. Confirmability entails the measure in which the data obtained has been well documented; this ensures that

the study evokes no bias and that there has been no interference with its findings (Marshall & Rossman, 2016:262). In my study, I ensured confirmability by the means of detailing the accounts of the participants through recorded interviews that detailed the exact words of the participants. I also used observation, the aim of which was to detail all the events of the study in a journal throughout the study. I noted in writing any changes and possible new development that could emerge in the study. Lastly, I rechecked if the data that had been obtained were aligned with the recorded data.

1.9   ETHICAL CONSIDERATIONS

According to Creswell (2016:48-49), the definitions of research ethics in social sciences are mainly grouped together where all the ethical principles and rules are definite (in a consensual and binding way), stating the relationship between the researcher and the participant and how it should be handled. Leedy and Ormrod (2014:107-110) give clear guidelines that need to be followed to ensure that the researcher proceeds ethically. Thus, I made use of these guidelines while conducting my study.

Firstly, I applied for ethical clearance for my study from the Ethics Committee of the University of Pretoria. My ethical clearance number is EC 17/06/05. Once the Ethics Committee had approved my work, I went on to inform the principals of the selected schools and extensively explained the purpose of my research to them. I also asked the principals for permission to enter the research site and issue the informed consent forms to the participants. The informed consent forms stated clearly that their participation was voluntary and they had the right to withdraw from the research process at any time.

I started off by assuring all the participants of their rights, explaining the process that would be followed during the research process and what the purpose of this study was. It was important to make sure that the participants knew that they would remain anonymous for this investigation. I also made it clear that during the process, I would take on the role of researcher; thus, I would always respect my participants and gain their trust, ensuring the confidentiality of the data by doing so. One of the last aspects of ethical consideration includes keeping the participants safe from harm. Thus, the participants would not be exposed to any component or event that would pose harm to their wellbeing.

1.10   CONCLUSION

In the first chapter, I outlined the introduction, after which the background, rationale, purpose and research questions were provided. I presented a brief literature review with regard to executive functions and how they affect learning and school readiness. Furthermore, in the chapter, I analysed how poverty affects the development of executive functions in children, and I incorporated Vygotsky's conceptual framework to demonstrate the basis of learning; this will ultimately add value to the body of my work. In the next chapter, I will add detail to the literature review where the concept of executive functions will be discussed in depth.

CHAPTER 2

THEORETICAL PERSPECTIVES ON EXECUTIVE FUNCTIONS

2.1   INTRODUCTION

The purpose of my study was to explore what executive functions are in order to understand how these are implemented in Grade R. According to Diamond (2012:335), "executive functions are self-controlling skills that permit people to think, focus, and manage their impulses". Hence, the second chapter will critically analyse the nature of executive functions in order to understand what each component is and to explore how these functions help learners in a classroom setting. Secondly, I will examine the development of executive functions to comprehend how these skills grow. Thirdly, the cognitive development of children will be explored. Cognitive development in children is important as it provides insights regarding young children's capabilities when they begin formal education. The chapter will also outline school readiness and the value it has in preschool preparation; this is to enable the reader to understand why school readiness is important. Finally, in the last part of the chapter, I will look into the impact that poverty has on executive functioning and how Vygotsky's theoretical framework applies to the knowledge.

To understand where learning strengths or weaknesses lie, Cooper-Kahn and Dietzel (2008:9) suggest that "the focus of executive functions represent a significant advancement." Therefore, by assessing learners' executive functioning, the reasons for poor performance can be understood to address learners' level of school readiness. In the next section the components of executive functioning will be discussed.

2.2   EXECUTIVE FUNCTIONS

According to the literature (Cooper-Kahn & Dietzel, 2008:10 and Dawson & Guare, 2010:1), executive functions encompass a mental plan that applies cognitive and behavioural skills to perform tasks. These functions involve the cognitive effort of regulating thoughts and actions to meet the objectives that are necessary to obtain a goal (Levine & Munsch, 2016). The word "executive" illustrates that executive functions involve higher mental operations. These higher mental operations dictate thought and response to situations; hence, higher mental operations govern most

actions of people (Cooper-Kahn & Dietzel, 2008). Apart from regulating and coordinating thought and behaviour, executive functions also gather relevant information by means of sifting necessary details (Perry & Hodges in Salthouse, 2005:532).

Gathering and scrutinising information are important because these actions help people both to analyse their environment and make better choices. Children at school, for example, need to have the ability to analyse the "bigger picture or major themes as well as the relevant details and shift back and forth between the two" (Meltzer, 2010:6). This example coincides with the definition of Cooper-Kahn and Dietzel (2008), where executive functions are viewed as not only managing behaviour but also configuring the resources needed to reach a goal. Their definition is unique in that it exemplifies how internal abilities (cognitive skills) not only analyse the ways by which a goal is achieved but also highlight the external measures by which an objective is reached, such as using the environment and different tools (Cooper-Kahn & Dietzel, 2008). Without either of these skills, learners would make choices that are only favourable for the short term, which would affect their learning performances. Executive functions, however, permit learners to recognise the bigger picture, so that the actions they take can assist their long-term learning objectives.

Diamond (2012:335) suggests that executive functions operate as a mental COP (controller, organiser and planner); in other words, these functions implement a needed structure to execute tasks. Just as a police officer implements law and order, executive functions regulate emotions, attention and behaviour to obtain a desired goal.

Figure 2.1 on the following page illustrates how the executive functions regulate cognitive and behavioural functioning.
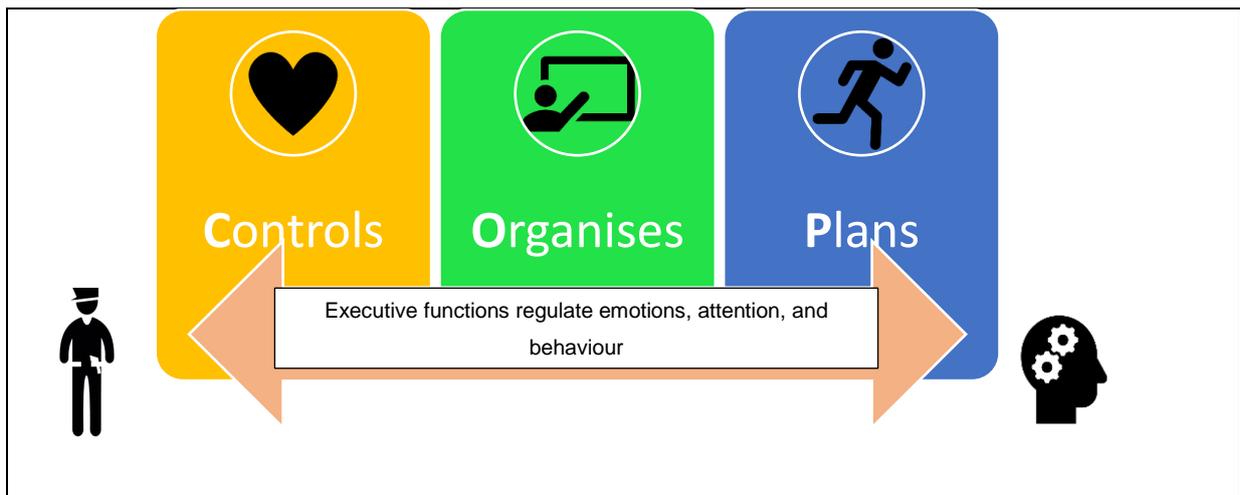
Figure 2.1:   How executive functions regulate human functioning

Source: (Diamond, 2012:335)

As outlined in the literature, figure 2.1 illustrates how executive functions regulate human behaviour in that it controls how we respond to fulfilling our desired goals. Emotions, attention and physical activities for example, are all regulated by executive functions. This is because the cognitive system (noted under the executive domain) plays a key role in planning, executing and consequently controlling human behaviour (Heatherton, 2011). Furthermore, the brain is the prime regulator of all physical activities; hence, behavioural skills with regards to executive functions can only be attained once the cognitive skills have been mastered (Heatherton, 2011:3).

In elaborating the fundamental cognitive operations, Shaul and Schwartz (2014:750) highlight that cognitive tasks include paying attention, remembering, planning and problem solving. These functions are classified as cognitive skills because they formulate mental operations (Esterhuizen & Grosser, 2014:114). Esterhuizen and Grosser (2014:114) furthermore assert that cognitive skills comprise low-order and high-order operations. Low-order operations, for example, are the basic cognitive tools that capture and organise information, whereas high-order operations involve the utility of lower-order skills to "manage and supervise thoughts to regulate behaviour" (Shaul & Schwartz, 2014:750). Taken together, executive functions are both higher- and lower-order cognitive operations that choose and control human behaviour (Esterhuizen & Grosser, 2014:114). This

definition explains how executive functions are both cognitive and behavioural skills that permit people to obtain their goals.

2.2.1   Executive function constituents

Executive functions consist of three prime constituents, namely working memory, inhibitory control (also self-regulation) and cognitive flexibility (Duval, Bouchard, Page & Hamel, 2016:2). These three factors form the basis on which knowledge is acquired; thus, the ability to remember, store and manipulate information is rooted in the realm of executive functioning (Fitzpatrick, 2014:159).

2.2.1.1   Working memory

The first component of executive functions is explained by Gathercole and Alloway (2008:2) as a place where the information of performing tasks is stored. The 'working' element refers to information that can immediately be recalled carrying out a specific action, which includes remembering the pages in a book or remembering the names of learners who should be in the class (Fitzpatrick, 2014:159).

Studies indicate the relationship that working memory has with short-term memory, as compared to long-term memory (Gathercole & Alloway, 2008:12 and Shaul & Schwartz, 2012:52). Short-term memory relates more to the working memory because it holds information that will immediately be used (Bryce, Whitebread & Szucs, 2015:183). Long-term memory, on the other hand, is not closely related to the working memory because long-term memory holds information that is utilised both currently and in the future. According to Gathercol and Alloway (2008:11), there are two ways in which the working memory gathers information; one of these is through visual information and the other through verbal senses. This means that children remember better when they use both their auditory and visual skills (Dodge, Colker & Heroman, 2002:21). The working memory has been noted to expand as a person grows older; however, its retaining capacity or size differs among people (Gathercole & Alloway, 2008:11). A child, for example, can have the memory of someone older, and an older person can have the memory capacity of someone much younger; consequently, with the working memory it is not a case of 'one size fits all'. Size depends on the uniqueness of a person (Diamond, 2013:13-14). The literature notes that one of the few ways in which a child's working memory can be

improved is through paying attention and understanding a concept by effectively organising the child's knowledge (Gathercole & Alloway, 2008:32). This can occur when the child processes information correctly by making sense of it. Similarly, the effective organisation of mental schemes enables cognitive development (Diamond, 2013:14). Putting it differently, knowledge can only be processed, and thus internalised (organisation of mental schemes) if the content makes sense to the child.

Research (Fitzpatrick, 2014:159 and Gathercole & Alloway, 2008) notes the important connection that the working memory has with learning. The working memory is particularly important for learning because it retains and retrieves information from the memory block (Duval et al., 2016:2). When children accurately retain information, it enhances their chances of correctly completing classwork and passing assessments. Similarly, this optimises their learning and capability of academic achievement (Bryce et al., 2015:184). Without the working memory, children become disorientated as they forget or become distracted from performing the next step. In the classroom, for example, practical activities that make use of the working memory include remembering instructions or storing the details of a topic. Forgetfulness and a lack of focus lead to the failure to complete a task and ultimately the failure to meet learning requirements (Gathercole & Alloway, 2008:9).

2.2.1.2   Inhibitory control

The second element of executive functions is inhibitory control (also called "self-regulation," according to Singer and Bashir, 1999). The environment is known to expose a person to various sources of information, and it is up to the individual to regulate how he or she responds to the information to achieve a goal. Inhibitory control involves the human ability to be self-disciplined (Diamond, 2013:2). Self-discipline, for example, regulates actions and behaviour in favour of attaining a goal; this kind of skill is particularly important for learning because it enables learners to grasp knowledge and complete their work (Carlson & Moses, 2001:1033 and Fitzpatrick, 2012:7). Heatherton (2011:11) notes that "without inhibitory control, people could be impulsive, emotional wrecks, lashing out upon the smallest provocation, blurting out the first thing that comes to mind, and engaging in whatever behaviour feels good at the time." Hence, inhibitory control does not serve to help

only the individual but also other children, as this skill safeguards the learner from engaging in hurtful activities against others and themselves (Fitzpatrick, 2012:7).

Heatherton (2011:2) postulates that inhibitory mechanisms include alteration, commencement, prevention and the corrections of certain acts, and refers to other behavioural efforts of the inhibitory control that include concentrating, listening and withholding social inclinations during lessons. In other words, these skills enable the child to change unacceptable behaviour, for example by refraining from talking in class and making the decision to listen to the teacher instead.

Two ways through which inhibitory control can develop are through social interactions and biological factors (Singer & Bashir, 1999:266). Children, for instance, learn how to regulate their behaviour based on initial interactions adopted by their families (Boivin & Bierman, 2014:214). During family interaction, children learn how they ought to behave and treat people around them. Biological factors, on the other hand, are features in the body that regulate interactions with others (Heatherton, 2011:12). Heatherton (2011:12) believes that behaviour is the result of mental operations because the nervous system comes to pair cognition with behaviour.

In having inhibitory control, higher mental abilities (such as problem solving and planning) develop in children because they have learnt the means to surpass environmental distractions in favour of achieving a goal (Moll, 1990:130). Furthermore, learners develop the means to engage appropriately with one another. Simple actions, such as waiting their turn or refraining from saying hurtful things, optimise co-existence in the learning environment (Dishion, 2016:59). Heatherton (2011:3) found that children who develop healthy social skills will most likely form and sustain healthy relationships since they get along with others; healthy relationships, in return, allow an easier adjustment to formal education. Another advantage is that when learners behave during lessons, it permits lessons to succeed effectively. The teacher then gains time to deliver the lesson objective successfully, instead of attending to the unruly behaviour of learners (Sasser et al., 2015:681). Here, inhibitory control works to the advantage of both the learners and the educators.

2.2.1.3   Cognitive flexibility

The last constituent of executive functions is cognitive flexibility. Cognitive flexibility deals with the way the mind can use different concepts and develop various ideas to solve a problem (Cooper-Kahn & Dietzel, 2008:121). According to Barak and Levenberg (2016:40), this skill "is a key competency necessary for adapting to new learning environments, for transferring knowledge to new situations, and for understanding and solving unfamiliar problems." The mind is flexible when it can attain, assemble, or manipulate information from the environment (Meltzer, 2010:6). The advantage of cognitive flexibility is that, as children develop their problem-solving skills, they are able to excel academically and accomplish a task by collaborating with others. It is worth noting that cognitive flexibility operates well with the help of the working memory. The working memory makes it possible for cognitive flexibility to retain concepts to develop new ideas further (Fitzpatrick, 2014:159).

Without cognitive flexibility, the human mind remains narrow (Clements, Sarama & Germeroth, 2016:80). As a result, a person is unable to grasp, relate, or even contrast various concepts. A confined mind hinders cognitive development because the child is unable to construct new knowledge (Cooper-Kahn, 2008:121). The learning that is often found at schools integrates different fragments of knowledge and enables different people to work together (Barak & Levenberg, 2016:41). Thus, learners need to have the skill that permits them to gather and work with different concepts, so they can learn and work well with others (Barak & Levenberg, 2016:41 and Meltzer, 2010:8).

The literature states that cognitive flexibility in children is still in the developmental stages as these skills involve "illogical thinking" in young children (Croker, 2012:3 and Louw & Louw, 2007:155). Furthermore, Levine and Munsch (2016) also note that children younger than five years cannot systematically switch between different tasks – this is evident since children require explanation, examples and guidance to complete any working task. Without the help of an adult, children battle to complete working activities on their own (Gray & Macblain, 2012:78). In addition to explanation and guidance, children hold the information taught by adults as absolute truths (Louw & Louw, 2007:217, in reference to Piaget, 1978). Young children's cognitive reasoning is still rigid since they do not challenge or understand different

concepts of theory. Thus, cognitive flexibility in children only commences in middle childhood, which is referred to as the "operational phase" (Louw & Louw, 2007:217, in reference to Piaget, 1978).

Shaul and Schwartz (2014:751) emphasise that the three executive constituents of executive functions – inhibitory control, working memory and cognitive flexibility – do not operate in isolation; there is a reciprocal relationship among these elements, which enhances the performance of one another, as illustrated in Figure 2.2.
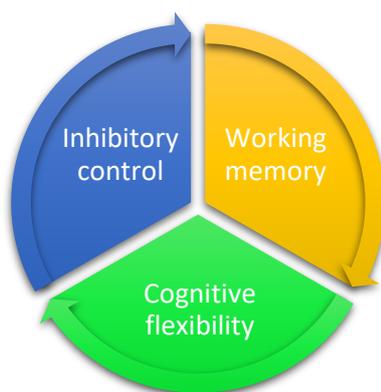
Figure 2.2: **Reciprocal relationship among the constituents of executive functions**

Firstly, inhibitory control makes it possible for the working memory to obtain information (Diamond, 2013:8). Memorising, for example, can only occur when a person pays attention, but without it, one can easily lose focus. Secondly, the working memory stores the captured information only to be utilised – hence, the term "working" indicates how the captured information will be put to use (Cooper-Kahn & Dietzer, 2008:13). Lastly, cognitive flexibility then manipulates information in the working memory to generate new ideas (Louw & Louw, 2007:237). This skill of manipulating cognitive schemes enables a person to attend easily to various tasks at the same time. Learners have developed such multi-tasking skills when they are able to devise a plan of the future steps to take while they are listening to the teacher's explanation (Meltzer, 2010:9). In order to understand how the components of executive functions interrelate, the study will next look at how executive functions develop in children.

2.2.2 The development of executive functions

Studies reveal that the executive functions of children develop during the preschool phase and gradually mature as they get older (Levine & Munsch, 2016 and Sasser

et al., 2015:683). The presence of executive functions is noticeable when children can select, respond to and develop ideas of their own (Samuels et al., 2016:479). From the ages of two up until seven, children exercise control over their actions and the environment when they select items or respond through actions by picking up an item they desire (Cooper-Kahn, 2008:17). Both the actions of selecting and responding permit children to slowly master the ability to choose the right tool needed to accomplish a task. This further enhances their learning because they gain the means to manipulate and substitute objects with others (Barak & Levenberg, 2016:40).

Also, the structure of executive functions is developed by internal and external factors. Internally, executive functions reside in the prefrontal cortex of the brain (Harvard University, 2011:4). This is because the prefrontal cortex is the central system in charge of exercising decisions (Levine & Munsch, 2016). However, studies have discovered that the neighbouring prefrontal areas also regulate executive skills (Fitzpatrick, 2014:159; Meltzer, 2010:4 and Salthouse, 2005:533). A few of the tasks that the prefrontal cortex performs, are to initiate activity, to direct behaviour and to process the knowledge humans learn (Croker, 2012:61). Louw and Louw (2007:231) note that early learning deficits are sometimes marked by hindrances in the prefrontal area. Therefore, cognitive and behavioural skills should be developed during the early years so that they can stimulate metacognition and learning while children are still young (Thompson-Schill, Ramscar & Chrysikou, 2010:259). Hence, my study will provide information on exactly what teachers do when they develop executive skills in Grade R.

The external attributes that develop executive functions are various and mostly encompass a stimulating environment (Dishion, 2016:58 and Duval et al., 2016:4). A stimulating environment consists of learners interacting with the right tools, participating in activities and engaging with peers or family members (Fitzpatrick, 2014:161). Harvard University (2017) also notes that card and board games, physical activities, movement or games involving songs and quiet reflective activities are some of the measures that can enhance executive functioning in young children.

According to Bigge and Shermis (2004:128), as well as Gray and Macblain (2012:71), people enclosed in a particular setting influence the development of

executive functions. Current research points out that parental behaviour may have an effect on children developing executive functions during their early years; this is because parents form the foundation for classroom behaviour and academic success (Valcan, Davis & Pino-Pasternak, 2017). Duval et al. (2016:3), for example, found a correlation between parents who have knowledge of cognitive and behavioural skills and the executive skills of their children. Parents who are aware of these skills instil the same knowledge in their children (Boivin & Duval, 2014:214; Louw & Louw, 2007:164 and Meltzer, 2010:99).

Although the immediate environment enhances the executive functions, it can also thwart the growth of these functions (Holmes, Kim-Spoon & Deater-Deckard, 2016:32-33). Harvard University (2011:6) found that "adverse environments resulting from neglect, abuse, and/or exposure to violence can impair the development of executive function skills because of the disruptive effects of toxic stress on the developing architecture of the brain." Hence, negative experiences can impede the ability of the brain to grow and operate effectively (Blair & Raven, 2016:31 and Feeney, Moravcik, Nolte & Christensen, 2010:142). It is important that parents and educators work together to minimise environmental stressors and enable children to abide in a conducive environment as it has a direct impact on children's learning experiences (Harvard University, 2016:7-8).

2.2.2.1   How executive functions permit children to learn

According to Clements et al. (2016:80), "children need to plan, focus attention, and remember past experiences"; these are all constituents of executive functioning, according to Meltzer (2010:5). Executive functions permit learning to occur because they support the attainment of knowledge in various subjects (Clements et al., 2016:80). To illustrate this, the correlation between the three constituents of executive functions and learning needs to be noted. According to Dawson and Guare (2010), inhibitory control optimises learners' focus and disciplines them to complete their work during lessons. In addition to self-regulation, learners need prior knowledge to make sense of new knowledge they attain; hence, the working memory is the storage compartment that retains and retrieves the information that children gather from their environment (Gathercole & Alloway, 2008:2).

Lastly, with cognitive flexibility, children master the ability to develop new ideas and further their comprehension of matters using prior knowledge (Barak & Levenberg, 2015:40). Cognitive flexibility provides the space for learners to be creative, unique and open-minded to develop their own learning style (Cooper-Kahn & Dietzel, 2008:8). These cognitive skills, according to Barak and Levenberg (2015:40), are important for learning because they promote metacognition, knowledge comprehension and, ultimately, academic achievement in learners (Barak & Levenberg, 2015:40).

Just as learning entails building blocks, executive functions consist of working blocks that secure an operation of each of their components (Harvard University, 2011:3). For example, the ability to concentrate (inhibitory control) and remember details (working memory) allows a person to modify old information and develop new knowledge (Diamond, 2013:9). This permits the assimilation of knowledge to occur, resulting in cognitive development. Having analysed how executive functions enable learning, the study will next seek to understand how children can be prepared to learn formally in the schooling environment.

2.2.2.2 Importance of executive functions for learning

Formal learning requires children to execute tasks daily (Meltzer, 2010:3). One of the important reasons for developing executive functions is that these functions enable learners to regulate their own learning by organising and planning their work to complete tasks successfully (Meltzer, 2010:9). Figure 2.3 below demonstrates how executive functions enhance other learning areas at school.
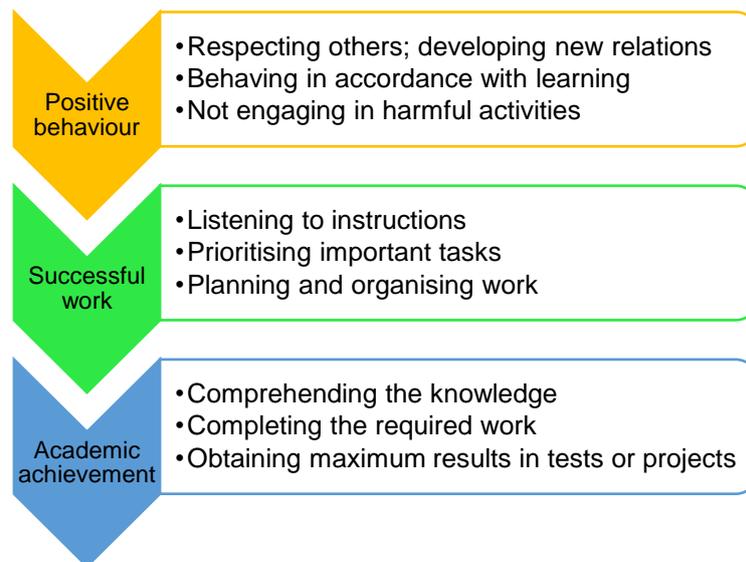
Figure 2.3:   How executive functions promote successful learning

Source: Adapted from Harvard University, 2012

Figure 2.3 above demonstrates that the absence of executive functions would result in disorganised, lawless and messy conduct and engaging in risky behaviour. Furthermore, the absence of executive functions impedes learning, resulting in poor academic performance (Fitzpatrick, 2014).

As executive functions have a direct impact on the cognitive skills of the learner, it is also important to explore how cognitive development occurs during the early years and what its relationship with executive functions is. The rationale for this analysis is to understand how the cognition of Grade R learners operates so that teachers can develop their executive skills to assist with school readiness and formal learning.

2.3   COGNITIVE DEVELOPMENT

Cognition, according to Gross (1984:3), refers to any mental operation that occurs in the mind. These working operations include memory, reasoning and problem solving (Goswami, 2011:1). Thus, cognitive development deals with the way the mind operates and thinks during the early years (Dodge et al., 2002:21). Van Rensburg (2015:2) adds that cognitive skills play an important role in learning because they permit the attainment of knowledge and adjustment to formal education.

The epistemology of cognitive development originally stemmed from the Lachean and Katian theories (Gross, 1984:3). Gross (1984:3) explains that, according to the Lachean perspective, one needs to inspect the nature of cause and effect to understand the human mind. On the other hand, the Katian perspective suggests that humans are involved in their creation of knowledge, and not passive bystanders who attain knowledge (Gross, 1984:4). In other words, both external and internal influences are involved in the development of the cognition. According to Gross (1984:29), Jean Piaget's development theory combines these two perspectives and his theory is still regarded as one of the most widely acknowledged development theories because it specifically deals with the cognitive development of children up to adulthood. The study will make substantial reference to Piaget's theory of cognitive development to comprehend the cognitive structure and abilities of Grade R learners.

2.3.1   Piaget's theory of cognitive development

According to Croker (2012:11), a theory is a body that "describes, explains and predicts" a phenomenon. Piaget's cognitive development theory highlights how the cognition of children matures through changes in the cognitive system (Barrouillet, 2015:1).

According to Croker (2012:12), Piaget's cognitive development theory involves biological and psychological factors; hence, the combination of both factors permits children to learn (Feeney, 2010:132 and Gross, 1984:30). According to Piaget (1978, in Goswami, 2011:259), cognition develops in different stages, and repetitive actions alone cannot intellectually stimulate one's mind. Instead, when children utilise their higher cognitive skills, it enables development to transpire. Thus, higher mental operations develop the mind when the mind comprehends a concept and assimilates new knowledge; this is especially necessary if humans are to gain different fragments of knowledge from the environment (Goswami, 2011:270).

Further detailing Piaget's cognitive development theory, the development process consists of four stages. These are the sensorimotor period – birth to 24 months; the preoperational period – two to seven years; the concrete operational period – seven to 12 years; and lastly, the formal operational period – 12 years to adulthood (Croker, 2012:14 and Goswami, 2011:260). For the study, my focus will centre on

the preoperational period (age two to seven years) because the study seeks information that centres on the cognitive operation of Grade R learners transitioning into first grade (this is from five to six years).

In the preoperational period, the child enters the phase that grooms him or her for formal learning. According to Levine and Munsch (2016), the preoperational period of the child centres on the stage of cognitive growth. Furthermore, language and memory develop, while illogical thinking transpires (Feeney et al., 2010:148). The way in which children's cognition operates is critically determined by their executive skills (Louw & Louw, 2007:219). Thus, the study will now analyse the perception or cognition, memory, language, reasoning, numeracy and literacy of the preoperational child. The aim of this is to understand children's cognitive structure.

2.3.1.1   Perception or cognition

Children's perception is represented by cognitive schemes (Gross, 1984:30), which, according to Louw and Louw (2007:24), are defined as abstract images that represent a term. They largely determine thoughts and responses to situations (Gross, 1984:30 and Louw & Louw, 2007:24). When a child hears the word "hot," for example, the image of a stove or a heater would appear in his or her mind. The term "hot" in their mind equates to danger or pain. Consequently, the child will respond by moving away from the dangerous object. In having mental concepts of things, children can identify and tell apart their features. in doing so, they can only observe one aspect at a time (Louw & Louw, 2007:24); this is because young children cannot simultaneously register information all at once (Levine & Munsch, 2016). Other operations that children cannot do are simultaneously registering information and reversing mathematic operations. For example, although they may know that 3 + 4 = 7, most children struggle to understand that reversing this sum implies subtracting the following: 7 - 4 (Louw & Louw, 2007:24).

Furthermore, changes in children's thinking patterns are the result of adaptation and effective organisation of schemes (Croker, 2012:13). Adaptation, according to the literature (Croker, 2012:13; Gross, 1984 and Levine & Munsch, 2016), refers to the experiences that change the knowledge humans have about something, and external factors, in particular, play a significant role in causing adaptation. An

example of this is food toys – although it looks like food, it cannot be eaten. If a child were to try and eat a food toy, he or she would realise it is not edible and hence adapt his or her knowledge that the toy is used for playing and not eating.

2.3.1.2 Memory

As children absorb information from the environment, it gets stored in their memory system, which facilitates the organisation and categorisation of schemes (Gathercole & Alloway, 2008). Memory, according to Gathercole and Alloway (2008:12-13), is classified into short-term and long-term memory. Storing information in either compartment occurs through observing routines, associating ideas and rehearsing. The information captured in one's mind remains active unless it is dormant. Repeated retention of information, for example, develops one's memory capacity (Gathercole & Alloway, 2008:8). The more a person exercises remembering things, the easier it becomes to store information, and the capacity of the memory grows. Children can recall events from the past and easily apply the information associated with these in their present actions.

2.3.1.3 Language

Gross (1984) describes language as a systematic body of words that convey ideas to others and ourselves. Croker (2012:85) mentions that children are highly exposed to language from the age of two to five. During the early years, children can construct small sentences by putting together names of – or words for – objects and ideas (Dodge et al., 2002:26). Their memory of different words allows children to call, ask and communicate ideas. Children pick up the pronunciation of words from hearing them and imitating those around them (Feeney et al., 2010:152). Thus, it is through exposure to and interaction in the environment that the development of communication is fostered – words are the tools that structure the ideas children wish to express (Croker, 2012:96). At around the age of four, children gradually add more words to their vocabulary. This is to elaborate on the ideas they have or want to communicate; hence, children around the age of four can construct sentences when they speak (Louw & Louw, 2007). Some children can even describe certain words because they know their meanings. For example, for the word "sad," the meaning of sadness, according to a child, equates to unhappiness or even crying (Gross, 1984 and Levine & Munsch, 2016). Louw and Louw (2007:170) provide

examples of the way pre-schoolers communicate by referring to their misuse of the past tense and active voice and over-extended speech, as well as the tendency to speak to themselves.

2.3.1.4   Reasoning

According to Levine and Munsch (2016:288), children past the preoperational phase logically reason in accordance to inductive or deductive reasoning. The difference between these two types of reasoning is that inductive reasoning concludes with a general opinion, whereas with deductive reasoning, it ends with a specific notion in mind (Levine & Munsch, 2016). Taken together, Piaget found that neither inductive or deductive reasoning can be confirmed during the preoperational phase; instead, the transductive reasoning was noted to be present. Transductive reasoning occurs when casual links are formed; this means that the preoperational child 'may base their conclusions on a set of unrelated facts' (Levine & Munsch, 2016:289). Secondly, children in the preoperational stage associate events that occur in the same period to explain each other (Levine & Munsch, 2016). This essentially means that the preoperational child would solve problems based on associations (Goswami, 2011:222). Furthermore, children understand experiences from their own point of view as they are unable to grasp the perspective of somebody else; this is known as "egocentrism" (Louw & Louw, 2007:156). Egocentrism results in the preoperational period because children's logic has not yet developed fully (Feeney et al, 2010:148).

2.3.1.5   Numeracy and literacy

Since children can produce words, they also have the knowledge of a few numbers and can thus count (Croker, 2012:202). The ability to count sometimes means that the child can identify the number before and after a given number (Dodge et al., 2002:135). Furthermore, according to Croker (2012:199), children above the age of five can perform simple addition and subtraction sums. Although children lack abstract ideas of numbers, they use memory and counting to solve sums (Croker, 2012:199). At this phase, young children's mathematical way of thinking relies heavily on tangible objects to understand and solve a mathematical sum (Dodge et al., 2002:134-135). Young children's cognitive operations become more flexible as they grow (Croker, 2012:199).

Referring to children's literacy, Croker (2012:212) believes that literacy does not only relate to the ability to read. Dodge et al. (2002:126), explain that literacy encapsulates letter recognition, grapheme-phoneme and word recognition. The three components work to identify, manipulate and assist the child with sounding the letters when he or she reads. Therefore, knowledge and recognition of the letters of the alphabet play a key role in helping children to read at school because a poor knowledge of sounds and letters thwarts the child's ability both to read and ultimately to learn (Boivin & Bierman, 2014:167 and Croker, 2012:216).

2.4 SCHOOL READINESS AND THE VALUE OF PRESCHOOL PREPARATION

Boivin and Bierman (2014:168-169) indicate that there is a correlation between a child's reasoning, language, number and literacy skills and the exposure the child receives. Preschools and parents, for example, play a significant role in teaching numbers and letter sounds early in life. Preschools, however, are significantly important because they establish a more structured space for children in which to learn and grow (Cappelloni, 2013). Similarly, executive functions should be developed in the preschool as they help the learners to adjust well and perform better academically (Fitzpatrick, 2014).

Preschool, according to Magnuson, Meyers, Ruhm and Waldforgel (2004:120), is a learning body that consists of nurseries, day-care centres and crèches. Children who attend these preschools are between the ages of three and four years (Magnuson et al., 2004:120). The design of a preschool centres on child learning, and its learning approach incorporates things in which young children are interested (Cappelloni, 2013). Preschool learning consists of two learning bodies: the first body centres on self-discovery, while the second body centres on developing children's academic abilities. Self-discovery, for example, targets learning that encourages children to explore and develop meanings of their own (McEwan-Adkins, 1990:161).

Stolinska, Raskova and Smelova (2016:242) state that "in the stage of pre-school education, key competencies generally include competencies around learning, solving problems, communication and activities, and social, personal and civic competencies." Hence, the learning preparation that children undergo in preschool

develops their sense of self, as well as cognitive, behavioural and language skills – these fall in line with the executive skills (Dodge et al., 2002:42). The teaching technique in preschools discourages direct instruction; instead, it rather opts for children to learn as they play (Dodge et al., 2002:295). Learning through play has been noted to develop the cognitive, social, physical and emotional functions (Dodge et al., 2002:493 and Feeney et al., 2010:294). Feeney et al. (2010:294), specifically mention that the free-play approach develops specific domains such as motor skills, expression of feelings, sensory awareness, communicative skills, problem solving, creativity and imagination, organising and developing relationships among children. Similarly, the development of cognitive and behavioural skills is embedded in executive functions, which form the foundation for school readiness.

Fitzpatrick (2014:157) defines school readiness as children's preparedness in early learning, which includes the cognitive, physical and psychosocial skills to handle the learning circumstances at school. Moreover, Boivin and Bierman (2014:6) state that academic success can be attained when children are exposed to early learning. This is because the experiences of early learning have a positive impact on the child's learning success. Early learning falls in line with school readiness because it is the foundation of school readiness. Here, learners must acquire certain skills, and these skills relate to executive functions (Boivin & Bierman, 2014 and Feeney et al., 2010:40). According to Stolinska et al. (2016:241), preschool learning permits children to "form their personality, affect the building of social relationships and partnerships, and prepare the individual for the orientation in the advanced world." The definition provided is consistent with the interest of my study because it covers cognitive and behavioural capabilities in children – just as executive functions do. An analogy that can demonstrate the relationship between preschools and early learning is soil fertilisation – just as fertilisers produce and strengthen grass, preschools enable children to develop and strengthen their learning skills at an early age. In doing so, children strengthen their knowledge and ultimately enhance their own learning.

Early learning is important because it has a positive impact on children's learning success; one of the reasons for this is children's exposure to various subjects (Fitzpatrick, 2012). The first area in school readiness seeks to develop academic

skills, such as those of mathematics, reading and literacy (Fitzpatrick, 2014:159). The second area that preschools develop, according to Sasser et al. (2015:682), involves behavioural skills. Children in preschool develop the means for obeying rules, following routines and listening to instructions, all of which form part of the inhibitory control of executive functions. When children can follow general commands, this facilitates their adaptation to the learning and social environment. Furthermore, it assists with establishing healthy relationships among peers and improves learners' academic performance (Sasser et al., 2015:682).

Children from the age of three to five already display certain 'academic' abilities when they commence with formal education. McEwan-Adkins (1990:15) reports that characteristics of successful learners include utilising resources well, planning and executing tasks, good memory, language skills, the ability to analyse small details, being socially responsive and the ability to lead other children in working tasks (McEwan-Adkins, 1990:15). These skills pertain to executive functions and fall under specific domains; these are physical and motor skills, socio-emotional skills, cognitive and perceptive abilities, language, and communicative skills.

According to Van Rensburg (2015:2), "children entering Grade 1 should be able to understand the concepts used at the school." School readiness is this process that prepares children both to learn and succeed academically (Fitzpatrick, 2012:2). The importance behind preparedness to learn is that children can adapt to school when they have the necessary pre-skills, which results in their encountering fewer problems that impede their learning and functioning in the formal learning situation (Shaul & Schwartz, 2013:749). Apart from adjusting well at school, learning preparation is also the result of internal and external factors (Fitzpatrick, 2014:159). Internal factors pertain to one's cognitive skills, whereas external factors relate to the social and behavioural skills that are developed in preschools (Fitzpatrick, 2014:159). In the next section, I will discuss both the internal and external skills that are required for school readiness.

2.4.1   Physical and motor skills

Beginning with physical and motor skills, they involve the gross and spatial capability of the body (MacDonald et al., 2016:397). Control of the arms and legs assist children with completing actions such as writing, standing, sitting and holding

objects during lessons; these require the ability to use one's hands, feet and fingers independently (McEwan-Adkins, 1990:42). The physical body also makes the learning process easier because children get to experience learning through sensing and manipulating objects, resulting in their participating easier in a learning environment (McEwan-Adkins, 1990:42). The activities that are done at school pertaining to physical and motor skills include drawing, tracing, cutting and manipulating objects (MacDonald et al., 2016:397). Thus, the coordination and control of the body help children achieve learning objectives during lessons. Similarly, physical and motor skills go hand in hand with executive functions because they deal with conducting proper behaviour, that is, not to harm others or themselves. The study will probe whether educators are aware of executive functions in order to develop better strategies to enhance school readiness in learners. This question will be addressed in the empirical study (see Chapter 4).

2.4.2   Social and emotional skills

Social and emotional development is crucial for school readiness because it allows the child to interact and establish relations with his or her peers (Boivin & Bierman, 2014:232). Social skills of learners include working cooperatively and respecting and caring for both their peers and the teacher (McEwan-Adkins, 1990:63). The emotional skills, however, entail awareness of emotions and effectively expressing these and not hurting others in the process of doing so (Dodge et al., 2002:18). Therefore, children from an early age need to understand the different feelings associated with emotions, so they can positively express them (Boivin & Bierman, 2014:232). Emotions are important for school readiness because emotions foster self-esteem, self-efficacy and empathy for others (Boivin & Bierman, 2014:233). Social and emotional skills will be used in the context of my study because they are embodied in executive functions as they deal with regulating behaviour and emotional response. Hence, the study will aim to identify how teachers assist learners in developing control over behaviour and channelling emotions effectively in the social context. It would be meaningful to know what means teachers use and how they develop such skills.

2.4.3 Cognitive perceptual abilities

The cognitive domain is central to school readiness because cognitive development governs the overall functioning of the body. Furthermore, cognition helps children to understand and organise the information they absorb when they learn (Gross, 1984:3). Cognition entails remembering, recognising and comparing information (Gross, 1984:3). Hence, without cognitive abilities, a child would not be able to learn effectively at school. Similarly, the cognitive function also plays a role in executive functioning because it regulates control in performing a required task and allows for cognitive flexibility to occur. Therefore, in my study, I explored some of the ways in which teachers establish the training of cognitive flexibility in lessons, as well as the challenges they face in developing cognitive functions.

2.4.4 Language and communicative skills

According to Stolinska et al. (2016:242), "a sufficiently developed communication competency is seen as the basic prerequisite for the subsequent success of the child at school." In classrooms, for example, communication (through language) permits children to receive instructions and explanations from the teacher and allows the teacher to help eliminate any struggle or discomfort the child may come across (Boivin & Bierman, 2014:165). In addition to receiving information, McEwan-Adkins (1990:29) postulates that communication also permits children to impart their thoughts and needs. Stolinska et al. (2016:242-243), maintain that as children express their needs, they are equipped to engage with others. Dodge et al. (2002:22), warn that without communicative skills, the child can neither obtain information nor participate in the social environment.

Language and literacy, particularly in South Africa, would benefit from the improvement of communication skills (Fleisch, 2008; Spaull, 2013 and Spaull & Kotze, 2015). Because South Africa is a multilanguage and diverse country, a wide range of spoken languages exists. The primary language that educators use in the classroom is English; however, it is not the commonly spoken language of every learner in the classroom (Van Rensburg, 2015:3).

The South African reality includes the fact that many learners struggle with formulating and articulating the correct grammar when speaking and when writing (Macdonald, 1991 and Ncoko, Osman & Cockcroft, 2000). Being inadequately fluent

in the main language of instruction interferes with children's learning, reading, writing and spelling. As a result, their academic performance is affected (Brooks & Murray, 2016). Hence, my study seeks to assist learners who enter school to be better equipped to learn by exploring how executive functions can better prepare them for school. With this said, the study will hopefully provide insight and knowledge as to how society can assist with developing executive functions. This brings me to an analysis of school readiness and its impact on children's executive functioning.

2.4.5   School readiness and executive functions

Children already need to have certain skills by the time they commence school. Moreover, the skills they have should facilitate their ability to learn in class (Isaacs, 2012:1). According to Meltzer (2010:8), some of these skills are retaining information, paying attention, organising one's work and regulating both emotions and behaviour.

Fitzpatrick (2014:159) found that executive functions are the skills that permit learning to occur. This is because executive functions, according to Shaul and Schwartz (2014:751), enable cognitive and behavioural control over performing tasks and learning at school. The problem that is seen currently, however, is that not all learners commence school with adequate learning preparation (Van Rensburg, 2015:3). The following has also been found:

> [I]n South Africa, a significant number of young learners have not reached
> the required level of readiness to cope with formal learning in Grade 1,
> due to inadequate early learning experiences at home and/or limited
> access to quality preschool programmes (Bruwer et al., 2014:19).

Magnuson et al. (2004:117), also found that "differences in children's early childhood experiences play a formative role in shaping school readiness and this largely explain the skill gaps found at school entry." Hence, the fact that many children commence schooling without executive learning skills places them at a disadvantage academically and hinders their adjusting effectively at school (Fitzpatrick, 2014:159). Inadequate schooling preparations inevitably lead to executive disorganisation, as no grounds exist to develop executive functions

(Meltzer, 2010:8). Fitzpatrick (2014:161) identifies poverty as one of the major factors that hinder school readiness. Thus, the study will next explore how poverty can affect the development of executive functions in children.

2.5   IMPACT OF POVERTY ON EXECUTIVE FUNCTION SKILLS

Executive functions involve the controlling and organising of behaviour and attention of a person (Clements et al., 2016:80). These cognitive tools permit people to be cognitively and socially capable of completing tasks (Blair & Raven, 2016:31). Poverty, however, eliminates the possibility of acquiring such executive skills (Isaacs, 2012).

Through understanding the nature of poverty, Jensen (2009) defines the phenomenon of poverty as a state where a person is unable to gain the economic means to sustain him- or herself adequately. Furthermore, Engle and Black (2008:243) point out that "many poverty researchers use a broader definition suggesting that 'poor' means the lacking of not only material assets and health, but a hindrance in developing social belonging, cultural identity, respect and dignity, and information and education." Taken these various definitions into consideration, poverty not only deprives a person of obtaining physical goods but also diminishes the person's capability to develop his or her talents.

Rouse, Brooks-Gunn and McLanahan (2005) explain how a family's socio-economic status determines many of the underlying factors that ultimately affect school readiness. Learners from an economically constrained background will most likely encounter obstacles such as academic problems, emotional disturbances and behavioural problems (Van Zyl, 2012). Poverty has a negative impact on learners because of hunger, the absence of running water or electricity at home, poor health, illiterate parents and a lack of transport. Families that are financially constrained will most likely interact with and read less to their children compared to a family who earns a higher income. Being financially strong, therefore, would allow parents to assist their children with the preparation of school readiness (Rouse et al., 2005).

Holliday, Cimetta, Cutshaw, Yaden and Marx (2014:162) found that the achievement gap between low-income and higher-income students develops early in life. Learners who are affected by poverty are not always exposed to early

educational programmes. Isaacs (2012:8) also states that learners from low socio-economic backgrounds start school at a disadvantage, and that "their health, behaviours, and skills make them less prepared for school than children growing up under better economic conditions." She further claims that poverty has a significant influence on school readiness (Isaacs, 2012); therefore, Moore and Barbarin (2003) affirm that a learner's cognitive and language development can ultimately suffer under poverty. A study conducted by Isaacs (2012:2) stresses the importance of children having pre-academic skills because such skills enable them to learn in a formal school environment as these prepare learners to deal with the learning demands of such an environment (Van Rensburg, 2015:3). The problem encountered with poverty is that it diminishes any possibility of developing children's learning or enhancing the required skills at an early age. If a child lacks behavioural or cognitive skills, for example, he or she will most likely begin school inadequately prepared and struggle to adjust later (Fitzpatrick, 2012:6). Moreover, the time spent to develop these skills further delays the child's ability to learn, and this kind of backlog prevents the child from succeeding academically (Fram, Kim & Sinha, 2012:483 and Ryan, Fauth & Brooks-Gunn, 2006:234).

Poverty is one of the most detrimental forces that can hinder the development of the cognitive function (Duval et al., 2017:39). According to Duval et al. (2017:39), "poverty-related factors may impact brain function and cognitive development." Since the cognitive function underlies perception and comprehension, a constricting or poor environment can affect the way a child perceives things (Levine & Munsch, 2016). Perception and understanding play a vital role in cognitive functioning because they determine the interaction and responses of people. When a child gains a thorough understanding of a concept, the child operates better as this enables him or her to apply the learnt theory in different contexts (Carlson & Moses, 2001:1032). According to Levine and Munsch (2016), the mind of the child who comes from a deprived background grows gradually; this affects how soon the child can comprehend a concept or master a skill. Furthermore, the stimulation in the brain activates a working pattern (Blair & Raven, 2016:1). Since the cognitive function operates like a muscle, some of the cognitive components are inactive. It is, therefore, important that the cognitive function activates all cognitive skills to strengthen its working and learning capabilities (Blair & Raven, 2016:31). The

disadvantages of having weak cognitive functioning mean that learners will need to have additional support and learning materials to assist with their learning, and in a poverty-stricken community, this is often a challenge because the environment does not have the means to provide these (Cappelloni, 2013).

The working memory is also affected by poverty. In an empirical study. Tine (2014:600) found that "school-aged low-SES [socioeconomic status] children exhibit both verbal and visuospatial working memory deficits, possibly due to increased levels of stress." Furthermore, the working memory is hindered because neither does it have sufficient reference of concepts nor is it accustomed to holding a substantial amount of information (Duval et al., 2017:39). The child, in this case, becomes inattentive during a lesson as he or she cannot concentrate for long, and this affects his or her learning in class (Shoemaker et al., 2012:457 and Holmes, Gathercole & Dunning, 2010:5). Hence, the study aims to explore the methods that teachers introduce in the classroom to develop children's working memory.

Another area affected by poverty is a child's physical wellbeing. According to Jukes (2007:485), poor development, in the context of poverty, is often the result of a poor diet. Furthermore, the "common conditions of poor health and nutrition can affect education in several ways" (Jukes, 2007:485). One of the many examples is fatigue, caused by having a malnourished diet. The lack of eating robs children of focus and their ability to learn in class. Apart from shifting their focus, the child feels sleepy most of the time due to having low energy levels (Jukes, 2007:485). In not eating healthily, their immune system fails to fight illnesses, diseases and injuries, ultimately causing absenteeism from school (Jukes, 2007:485). Studies conducted by Macdonald et al. (2016:378), and Holmes et al. (2016:33), found that a weak physical body can have an impact on the fine and gross motor skills. According to these researchers, physical exercises such as writing with a pen and participating in activities become strenuous, and this demotivates the child to learn other things (Holmes et al., 2016:32-33 and Macdonald et al., 2016:378). The inability to perform tasks correctly results in children withdrawing themselves and developing a low self-esteem. Low self-efficacy and a lack of self-esteem, according to Lane, Lane and Kyprianou (2004:247), have an impact on learners' performance at school. My study

will help to broaden the understanding of teachers' experience of learners' executive functions at school as a result of poverty.

Poverty also has an impact on the social development of the child, which ultimately has an influence on executive functions. Sasser et al. (2015:681), found that children who come from poor backgrounds are more prone to struggling to adjust to school. This is because the environment neither provides stimulating opportunities nor develops healthy interaction with others (Ryan et al., 2006). Poor environments, instead, are associated with violence, crime and substance abuse (Engle & Black, 2008:245). One of the negative effects of living in a poor environment is exposure to harmful activities. Children imitate what they see, and the negative social activities they are frequently exposed to will be extended within their school (Jensen, 2009). Thus, my study would provide insight into the social problems found in the school as the result of weak executive functions.

In addition to struggling to adjust, children focus their attention on negative occurrences during lessons (Crane & Heaton, 2008:313). They become less optimistic owing to the discouragement of their surroundings, and this results in their developing feelings of inadequacy and sadness (Blair & Raven, 2016:31). The constant feeling of sadness develops depression; and depression is one of the factors that hinder cognitive development and executive functioning (Harvard et al., 2011:6). Hence, when a child experiences learning with negative emotions, it only promotes poor academic performance. Other negative emotions include low self-esteem, low self-efficacy and timidity; these also leave the child vulnerable to being bullied and performing poorly at school (Dishion, 2016:57 and Holmes et al., 2016:33). The moment that children can neither protect themselves nor do they feel safe in a setting, their ability to learn is blocked, based on their inability to participate with others socially (Holmes et al., 2016:33 and Jensen, 2009). Hence, my study sought to understand if the development of executive functions is attainable in constrained environments. This entailed exploring whether or not teaching in a poor context hinders the development of executive functions and aiming to discover some of the unique techniques that can be used in a poor setting. The study thus encompassed what teachers know about executive functions and how they develop these in their lessons.

As teachers are the primary guides and supporters during a lesson, they foster learning techniques that enable learners to acquire knowledge independently. This method of learning is noted in Vygotsky's sociocultural development theory. Hence, the study will next explore what this theory entails and how it enables executive functions to be taught.

2.6   THEORETICAL FRAMEWORK

The theoretical framework is the basis for understanding a phenomenon, and it outlines principles that explain the entity and functioning of a concept (Gray & Macblain, 2012:3). Theory, according to Bigge and Shermis (2004:2), is a "pattern of ideas accompanied by a planned procedure for carrying out"; hence, it outlines the structure detailing what the concept entails and how it functions, and it even outlines possible steps to reproduce the same concept. The groundwork done on theories are based on scientific studies and personal experiences; this is done to note the relations and changes that occur in the phenomena (Cohen et al., 2011:9).

Cohen et al. (2011:9), indicate the various uses of theoretical frameworks, which include assisting people to comprehend phenomena, solve problems and identify the gaps in the existing framework. In the case of conducting research, one needs to obtain a full understanding of a phenomenon to explore the topic further in hope of obtaining new findings (Cohen et al., 2011:9-10).

Considering such knowledge, the study used a theoretical framework as a lens to explain the way in which Grade R learners acquire learning concepts from their teacher. For my study, Vygotsky's (1978) sociocultural theory was deemed appropriate to guide the development of executive functions in learners. Vygotsky's sociocultural theory informs how facilitation can occur when the teacher supports or scaffolds a learner, which Vygotsky labelled the "Zone of Proximal Development" (Feeney et al., 2010:152 and Gray & Macblain, 2012:72). When implementing executive functions in lessons, teachers become the facilitators that transmit knowledge to Grade R learners, and this "permits a child to move forward and continue to build new competencies; hence, scaffolding engages children to collaboratively problem-solve" (Bigge & Shermis, 2004:130). Teachers in this context take on the role of experienced adults who enable the training of cognitive

and behavioural skills in learners. To thoroughly comprehend how educators prompt executive functions in lessons, the study would need to understand the learning theory that exists behind sociocultural learning.

2.6.1 The sociocultural theory

The sociocultural theory was conceived by Lev Vygotsky – a Russian psychologist who believed that learning occurs through the collaborative effort of the society, where these people have immediate contact with one another and a shared culture (Fitzpatrick, 2012:17). Bronfenbrenner (1979) opines that social interaction occurs in the microsystem, which he describes as the interaction between the child and the people closest to the child. Furthermore, social interactions contribute to the development of knowledge and skills in the child (Gray & Macblain, 2012:71 and Wells & Claxton, 2002:21). Vygotsky's learning theory, however, is based on constructivism, which explains how both teaching and learning techniques can support the mental construction of children (Gray & Macblain, 2012:70). The development of mental construction is vital to understand how executive functions can be implemented in lessons and the way in which learners can attain knowledge.

The term "sociocultural" indicates the manner in which society, culture and experiences play a central role in knowledge formation (Gray & Macblain, 2012:72). Dodge et al. (2002:34), explain the interrelation among these phenomena when they assert that the social environment is set up according to an existing culture; culture, therefore, dictates the manner in which people interact with and gain knowledge from one another. This social exposure permits the child to join and become involved in his or her surroundings, which is particularly important in making sense of one's world (Gray & Macblain, 2012:70). Socio-culture encapsulates how a child responds and behaves in an environment with others – this would be referred to as "self-regulation" in executive functions (Dishion, 2016). Sociocultural behaviour greatly influences how a child behaves and responds to environmental stimuli and determines how successfully or unsuccessfully children interact with others.

One of the main elements that distinguish Vygotsky's theory from other learning theories is its emphasis on psychological tools (Kozulin, 1998:13). Turuk (2008:48, according to Vygotsky 1986), interprets psychological tools as "artefacts created by humans under specific cultural and historical conditions." These tools enable

humans to process and communicate information when they interact with others. Three tools can be distinguished; the first is psychological tools, the second relates to interaction and the third to the application of concepts.

The literature demonstrates how Vygotsky furthermore divided the psychological tools into two groups – lower and higher thinking skills (Gray & Macblain, 2012:71). Lower thinking skills include memorising, paying attention and planning. Higher thinking skills, however, relate to how people embroil these lower mental skills together to solve problems and reason sensibly when thinking. Learning cannot occur without the interference of either type of psychological tools (Daniels, 2001:48-49; Kozulin, 1998:13 and Shabani, Khatib & Ebadi, 2010:238).

Psychological tools (also referred to as "symbolic tools" by Kozulin, 1998:14) are mechanisms that facilitate cognitive operation. Language, for example, particularly represents a form of a psychological tool because it assists people to utilise their cognitive skills and communicate their thoughts (Feeney et al., 2010:152). Although children inherently possess psychological compositions that enable them to learn, it is its societal culture that dictates the way to adapt (Dodge et al., 2002:34 and Gray & Macblain, 2012:72). What happens during children's early learning enables them to increase their cognitive abilities. The psychological tools highlighted by Vygotsky relate to the executive function of the working memory. The working memory is important as it regulates cognitive order when children perform given tasks or follow instructions from the teacher.

Another concept of Vygotsky's (1978) learning theory involves the interactive system. This, according to Vygotsky (1978), means that learning occurs through people transmitting knowledge to one another (Feeney et al., 2010:151). Development, according to Vygotsky (1978), does not occur in isolation but rather through communal engagement; in other words, children learn what they know by imitating and interacting with parents or friends. They actively participate by applying the knowledge that is taught to them. At school, learning occurs through interaction among learners, their teacher and symbolic tools (Kozulin, 1998:47 and Moll, 1990:319).

Previously, learning operated as a direct method of learners internalising knowledge from their teacher (Kozulin, 1998:48). Vygotsky's (1978) learning theory, however, rejected this technique. He reasonably opted for learning to occur through the means of guiding learners to construct their own knowledge (Vygotsky, 1978). His learning theory involves adult-child cooperation; thus, it integrates the adult, the child and psychological tools (Gray & Macblain, 2012:82 and Mercer & Howe, 2012). Learners are given the platform to explore and contribute their own knowledge (Kozulin, 1998:53). One of the strengths of Vygotsky's learning perspectives relates to the construction of knowledge that occurs when learners interact – the collective group of learners form a collage of knowledge (Wells & Claxton, 2002:53).

The last of various viewpoints in Vygotsky's learning theory involves how children get to apply the concepts that they comprehend (Dodge et al., 2002:35). To do this, teachers must know how the minds of children work and think – this is one of the reasons why the literature includes an introspection of children's cognitive development. When the teacher applies a familiar concept from the child's social context, it enables the child's thinking to develop meaning towards the unfamiliar concept (Dodge et al., 2002:35). Furthermore, the ability to apply knowledge in different learning contexts occurs easily because the child has grasped the means to diversify his or her thinking mechanisms (cognitive flexibility of executive functions). Knowledge that is inapplicable is lost easily, and when knowledge is lost, it affects the academic achievement of learners (Bereiter & Scardamalia, 1996 and Feeney et al., 2010:153).

2.6.2   Zone of Proximal Development

One of the ways in which teachers are encouraged to guide constructed learning is through enabling or empowering – what Vygotsky (1978) termed "the Zone of Proximal Development." Wells and Claxton (2002:105) define this process of learning to involve the pairing of an adult, who has mastered a concept with a learner who has yet to acquire the knowledge or skill. Kozulin (1998:47), however, centres his definition on collaborative learning and states that children need to be active participants in their learning and contribute to their knowledge in lessons. Collaborative learning thus includes the sharing of knowledge from peers, the learner and the educator, as opposed to a rote learning technique. Daniels

(2001:56) interprets the Zone of Proximal Development as the internalisation of knowledge that has been informally learned (spontaneous concepts) together with formal knowledge (scientific concepts) that learners have yet to attain. The Zone of Proximal Development is particularly important in my study as it demonstrates how the teacher, who is the adult that has mastered the skill, guides the learners in acquiring executive skills; however, it is both the educator and learners who collaboratively work to acquire techniques to implements skills (Bigge & Shermis, 2004:129). This form of constructed activity embodies "the process of self, subject, and activity organisation to eliminate perturbations" (Fosnot, 1996:37) here. Vygotsky's (1978) constructed learning activity works in accordance with the goals of executive functions by organising and regulating cognitive and behavioural skills in lessons.

2.7   CONCLUSION

The purpose of this chapter was to present a literature review that explains in depth what executive functioning and its three main constituents are. It was also important to explore how executive functions relate to school readiness, self-regulation and learning in children. According to the literature, studies have revealed how learners with executive skills both adjust to and excel academically at school. Those learners who lack these skills, however, struggle to set goals, to conduct themselves appropriately and to work effectively. Therefore, the literature affirms the need to prepare or introduce executive skills early on at school, as these have many far-reaching benefits for learners' learning careers. For the benefit of learners' schooling success, it is essential that preschool learners obtain maximum exposure to and cultivation of executive skills to cope with the learning demands throughout their schooling years. Moreover, the information reviewed in the literature outlined Vygotsky's contextual framework as a form of developing executive functions in learners. The next chapter will demonstrate how the study has been conducted.

CHAPTER 3

RESEARCH METHODOLOGY

3.1   INTRODUCTION

In Chapter 2, the literature with regard to executive functions was reviewed by exploring the topic in depth to demonstrate how it relates to the cognitive development of the child and the impact it has on learning, school readiness and academic achievement. Because the development and implementation of executive functions happen through the aid of a guide, Vygotsky's sociocultural theory has served as the framework that highlights how this interactive relationship enables learners to attain executive skills. Furthermore, the nature and progress of executive functions were discussed to demonstrate how they affect the cognitive, social and behavioural function of learners with the purpose of gaining an understanding of the profile of Grade R learners in order to grasp how teachers implement and develop executive skills during lessons. Studies have revealed that learners with executive control adapt and thrive in the learning environment; hence, the implementation of executive functions in early learning would serve to benefit the learning performance of many learners.

The objective of this chapter is to present the research methodology that has been followed to explore how teachers understand and implement executive functions in Grade R. The idea behind exploring executive functions (particularly in Grade R) is to highlight the necessity of developing executive skills in young learners, so that they are enabled to commence schooling, already being cognitively and socially ready to succeed academically. Henceforth, my research methodology consisted of the research design that included the research paradigm, approach and type. I will also discuss the research methods that I have applied and the aspect of trustworthiness and will conclude by debriefing the ethical considerations I have adhered to in my research.

3.2   RESEARCH DESIGN

Thomas (2013:10) explains "research design" as a plan that outlines how the research problem will be conducted; in other words, the research design is a layout that demonstrates the steps taken to perform the study. Nieuwenhuis (2007:70)

states that having a research design implies that the researcher should have presumed ideas on how to gather the data he or she needs. A research design summarises how the researcher thinks the problem ought to be explored. The next section of the study will discuss the features that pertain to the research design of my study. These include the research paradigm, the research approach and the type of research.

3.2.1   Research paradigm

In learning, specific viewpoints determine what knowledge is. According to Thomas (2013:53), a paradigm is noted as an unchanging thought that depicts the nature of a phenomenon; this enables people to understand the concept better. This author further suggests that a paradigm is a lens that determines what human reality is and also encapsulates what knowledge is (Thomas, 2013:53). Because the research paradigm steers the thoughts and beliefs on how a concept operates, it directs how a study will be carried out.
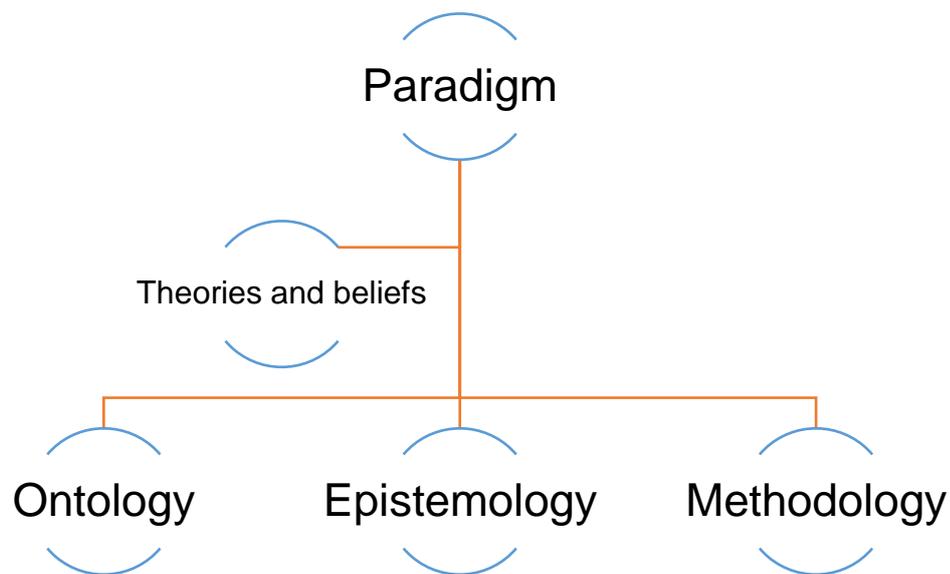
Figure 3.1:   The integral body of a paradigm

According to Creswell (2014:238), paradigms are an integrated system made up of three domains. The first domain consists of philosophical views that determine what its nature is – this is the knowledge we have or what we know (also known as "ontology"). The second domain deals with the connection between the knower and what is known – how we know what we know (this is called an "epistemology").

Epistemology (the theory of knowledge), according to the literature (Creswell, 2016:41 and Terre Blanche, Durrheim & Painter, 2006), is the essence of a study because it determines how the knowledge of the research will be explained. If a research study ought to be performed, one would have to understand what its theoretical underpinning is to comprehend how and where its knowledge is derived from (Creswell, 2016:40). Thus, in this study, my epistemological stance sought to explore the knowledge teachers have of executive functions to later understand how it is implemented in the Grade R lessons. For this reason, I collected my research data from Grade R teachers.

The last domain in the paradigm deals with understanding how the knowledge has been obtained – the methodology (Creswell, 2016:41). The methodology includes participating in the participants' natural environment to gain a first-hand experience of how they develop their knowledge (Creswell, 2007:238). According to Denzin and Lincoln (2005), participating first-hand in the natural environment of participants enables the researcher to comprehend how and where people construct their knowledge.

Lincoln and Guba (1985:15) go on to state that paradigms consist of thoughts that cannot be proved; this is because they are based on subjective experiences. In line with this view, Cohen, Manion and Morrison (2005:137) state that the interpretative paradigm allows participants to create their own interpretation of situations based on social experiences, which are later interpreted according to the individual's understanding (Wagner, Kawulick & Garner, 2012:55). With this being said, my study aimed to explore what teachers understand executive functions to be and how they implement these in Grade R, particularly to assist learners to adjust in class and to perform better academically.

Terre Blanche et al. (2006:275-276), define the interpretative paradigm as a well-suited theoretical frame that details the knowledge respondents experience on a regular basis. This statement explains how my research aims to understand what Grade R teachers deem executive functions are in order to analyse further how they transmit these functions into their day-to-day teaching practices. The interpretative paradigm ultimately matches my desire to include "the concern of the individual" (Clasquin-Johnson, 2011:78).

Considering the above explanation, employing the interpretative paradigm allowed me to capture the personal understanding and experiences of Grade R teachers, instead of conveying an objective and controlled response (Babbie, 2014:33). This research is deemed to be subjective because Cohen and Crabtree (2006:1) affirm that in a "reality that cannot be separated from our knowledge of it (no separation of subject and object), the interpretative paradigm posits that researchers' values are inherent in all phases of the research process and that truth is negotiated through dialogue." Thus, interpreting teachers' personal outlook on and experiences of executive functions is the anchor that guided my study. The unique experiences and viewpoints would ultimately bring meaning to the study.

The subjective viewpoint, according to Maree (2016:53), works in line with a particular research methodology; this is to make sense of the data and interpret the knowledge obtained from the participants. By utilising the interpretative stance, the research methodology allowed me to understand "the world as it is from subjective experiences of individuals. Furthermore, it uses meaning (versus measurement) oriented methodologies such as interviewing or participant observation that rely on a subjective relationship between the researcher and subjects" (Reeves & Hedberg, 2003:32).

The aim of the interpretative paradigm is to enable teachers to share their constructed understanding of what executive functions surround, particularly in learning. The teachers use their prior knowledge to construct their meaning of the concept. Burton and Barlett (2009:21) further point out that because the data are subjective, the researcher needs to be meticulous when gathering the data.

3.2.2 Research approach

In my study, I made use of a qualitative research approach. According to Nieuwenhuis (2007:51), qualitative research is an approach that deals with exploring social and cultural situations with the aim of understanding the reasons 'why' in research. Furthermore, a qualitative research approach is based on the participants' personal points of view.

Denzin and Lincoln (1994:2) state that a "qualitative research involves an interpretive, naturalistic approach to its subject matter; it attempts to make sense of,

or to interpret, phenomena in terms of the meaning people bring to them." Their work distinguishes the qualitative method from the quantitative by explaining that the quantitative method is more objective and scientifically detailed (Denzin & Lincoln, 1994). The qualitative method is more subjective and based on multiple realities (Harding, 2013:9-10). Translated to my study, this means that the information brought forward by the participants are interpretations of what they understand and experience. It is worthy of noting that there is no right or wrong way of interpreting meanings because the participants' experiences are unique. This falls in line with the interpretative paradigm that has been discussed earlier in the chapter because the interpretative paradigm looks to incorporate personal opinions and beliefs. Holloway (1997:2) explains that "researchers use qualitative approaches to explore the behaviour, perspectives and experiences of the people they study." Thus, the qualitative approach would be the most appropriate tool to explore what teachers understand executive functions are, and how they implement these in lessons. Consequently, this approach would suit the purpose of my empirical study.

The focal stance of the qualitative approach consists of people or schemes being observed in their natural setting (Creswell, 2016:6 and Marshall & Rossman, 2016:1). This is because the approach provides the platform for participants to divulge what they understand through the means of interacting with the researcher; thus, the ability to cooperate (in the qualitative approach) enables the researcher to ultimately construct the unique meaning of the phenomenon. Corbin and Strauss (2015:5) state that the unique traits of the qualitative approach consist of the participants' sentiments, views, knowledge, thoughts and actions because these help the participants formulate their unique interpretations of things. Ultimately, the newly found knowledge permits the study to develop different skills and take on other underlying obstacles with regard to the subject.

3.2.3 Type of research

According to Creswell (2016), a research type is a plan that indicates how the researcher will perform his or her investigation. Thus, it outlines the steps of the research to demonstrate the legitimacy of the empirical study (Maree, 2016:27). Legitimacy in research is particularly important because it serves the work as

credible; the findings of the study can, therefore, be applied in other learning contexts.

One of the most contributing factors in conducting a qualitative study is that participants add their unique experiences and knowledge (Christensen & James, 2008:48) to the study. With participants personally sharing knowledge, richness is added to the data so that the readers of the study can comprehend the phenomenon better. Hence, in exploring Grade R teachers' perspectives of executive functions, the need to include teachers' knowledge of the concept is edified so that the study can further comprehend how executive functions are being implemented in lessons. The research type not only identifies the reasons for the research questions but also adds significant information that relates to the study (Nieuwenhuis, 2007:75).

A well-known type of research utilised in a qualitative study is the case study. According to Harding (2013:16), a case study is defined as an inquiry that seeks meaning and understanding of a phenomenon by particularly analysing the phenomenon in its natural context. Here, the researcher has less influence on the matters surrounding the participants involved (Harding, 2013). The case study was regarded as the most suitable design for my study because it consisted of organised criteria that gathered data, examined the information, and communicated the findings of the work (cf. Marshal & Rossman, 2016:19). Furthermore, "the case study method allows investigators to retain the holistic and meaningful characteristics of real-life events" (Yin, 2003:2); hence, the objective to obtain teachers' understanding of executive functions would be attained with the use of this tool. Consequently, the reasons above demonstrate why my study employed a case study method.

3.3   RESEARCH METHODS

Research methods pertain to the steps detailing how and where the data will be gathered (Moustakas, 2011:266). Therefore, the selection of the participants in my study, their sites and the selection criteria will be discussed. Before that, I will discuss my role as the researcher.

3.3.1   Role of the researcher

Because my study was situated in the interpretive paradigm, this makes the researcher the data collector (cf. Creswell, 2016:187). Rossman and Rallis (2003:33) state that researchers are allowed to implement their own epistemologies as these embody their unique understanding. Often, epistemologies stem from several realities. Since these truths cover various notions, Creswell (2016:187) states the need for researchers to be unwavering with their presumptions so that the study can strive to be trustworthy and credible. Consequently, to prevent the researcher's preconceptions from being reflected in the study, constant self-reflection needs to be done as it enables truthful and transparent work (Creswell, 2007:192).

Since my study was conducted using a qualitative approach, my role as the researcher was to interview and observe the participants in their natural setting. McMillan and Schumacher (2006:344) state that, through this, the interviewer can develop the means to introduce, enlighten and develop an understanding of the topic at hand. Nieuwenhuis (2007:115) also mentions that the interaction between the researcher and the interviewee enables relationships to be formed since first-hand experiences and knowledge are being shared. Participating in teachers and learners' natural environment enables the researcher to observe and note the actions or conversations to better understand the research concept (Bryman, 2001:292). Since the participants were informed of my role as the researcher, it allowed me to witness their daily activities (cf. Bryman, 2001:301). Furthermore, although the data was physically collected by me conducting semi-structured interviews, lesson observations, as well as writing field notes during the observations; I still am not an insider but remained an outsider in the learning environment (cf. Corbin & Strauss, 2015:21-22).

3.3.2   Participants and research site

According to Creswell and Plano-Clark (2011:172), "to address a research question or hypothesis, the research has to engage in a sampling procedure that involves determining the location or the site for the research." Hence, a research site, according to McMillan and Schumacher (2006:319), is described as the place where the participants of the study can be found. However, to obtain access to the research

site, Creswell (2009:178) mentions that the researcher needs permission from the authorities of the research site. This implied that I had to approach the principals of the schools to obtain permission to conduct my empirical research.

Nieuwenhuis (2007:79) explains sampling as the "process used to select a portion of the population for the study." This, according to him, is particularly utilised in a qualitative study; hence, in my study, I made use of what is termed "purposeful sampling." Cohen et al. (2005), indicate that purposeful sampling is characterised as a selective process that identifies the most appropriate participants and their location. Similarly, Babbie (2004:183) describes purposive sampling as follows: it constitutes the selection of participants that are knowledgeable; the researcher should have knowledge of the group; and the knowledge obtained should be aligned with the purpose of the study. According to Patton (2002:169), one of the advantages of selecting appropriate candidates is that the selection process allows suitable authors to provide a large quantity of rich information. Through the participants sharing their experiences, this information enlightens the research topic (Creswell, 2012:125 and McMillian & Schumacher, 2006:322). Creswell (2009:138) affirms that the selection of the participants and their sites is determined by four factors: the location in which the study will occur, the groups that will be interviewed and observed, the occasions when the study will be conducted, and the process followed during these occasions.

For my study, I used convenience sampling to select the schools because many primary schools are found in the area, and convenience sampling provides easier access to find purposeful criteria. I purposefully selected schools in urban Pretoria because I had immediate and close access to the participants in this location. Although convenience sampling "saves time, money and effort," Creswell (2016:111) warns that it lessens the chance of the study of being credible. Therefore, to prevent the loss of credibility of my data, I interviewed a total number of eight participating teachers. My reason for selecting eight participants was to study comprehensively the density of the phenomenon each teacher holds (Creswell, 2012:209). It is worth noting my intentions of using both purposeful and convenient sampling in this context; both these samples played different roles with regards to selecting the participants for this study. Commencing with purposeful

sampling, it enabled me to specifically conduct my study with Grade R teachers – the deliberate choice based on certain traits of the target. On the other hand, convenient sampling enabled the means to select schools that are both available and accessible for research.

I chose four private schools with Grade R classes for the study to enable the transferability of the study in other different settings. Secondly, prior to commencing with my work, I had visited the schools and was aware of the schooling environment. By this time, permission to conduct my study was granted by the principals. In essence, private schools were best suited because they provided the availability of both teachers and learners; secondly, it enabled the study to compare the same type of schools; and lastly, all the schools I chose were easily accessible which meant that I could commute to the schools for interviews and lesson observations without difficulty. I could also schedule meetings with the teachers at any time of day and make their participation as comfortable as possible. For the purpose of my study, the participants were selected based on the teaching experience they had and the immediate environment in which they could be found. The participants had to meet the following criteria to be included in my study. They had to be:

- Grade R teachers;
- English first-language teachers;
- qualified teachers (have degrees or diplomas); and
- have a minimum teaching experience of four years

Purposeful sampling, according to McMillan and Schumacher (2006:322), consists of one to 40 participants; this, however, is subject to the purpose of the study, the research problem and the data collection technique used. Hence, for my study, I selected a total of eight (8) participants.

3.3.3   Data collection

The nature of qualitative research implies that a researcher has to ask wide-spread questions to participants (Creswell, 2012:212). This form of interacting enables the opportunity for participants to divulge their understanding and experiences of a phenomenon, and in doing so, information is obtained. Data collection, according to Creswell (2012:118), is a methodological procedure of accumulating information for

the study that aims to help answer the research questions. Anderson and Anderson (1998:163) state that the information is "observable and measurable," as this allows the researcher to investigate the meaning it holds so that it can enable the researcher to answer the research question.

In line with the qualitative approach, data are collected in principled ways that should not interfere with the routine of the participants (Creswell, 2002:227). I gathered the data for my study through conducting semi-structured interviews and making notes based on the observations that took place (cf. Harding, 2013:31). The methods used are discussed in more detail.

The interviews were conducted after school, whereas the observations of the lessons took place on the following day during school hours; the observations were conducted for a period of three hours and the interviews were held for approximately 45 minutes. The participants were interviewed and observed based on their teaching experience in training Grade R learners on executive functions and developing their cognitive and social skills; the two factors stated pertain to executive functioning and learning skills of learners.

3.3.3.1   Semi-structured interviews

Interviewing, according to Seabi (2012:89) and Jamshed (2014:87), is a technique that gathers views, thoughts and attitudes of participants. Furthermore, it allows the researcher to gain comprehension of the reality the participants hold, as interviews establish the platform from which to view the world through the lens of participants as important contributors of knowledge (Corbin & Strauss, 2015:39 and Nieuwenhuis, 2007:87). Hence, I used semi-structured interviews to investigate what Grade R teachers' understanding of executive functions are and how these functions are being implemented in lessons. Prior to conducting the interviews, I had a pre-elaborative session with the teachers to enlighten them about the term "executive functions" (see Appendix G). This was done to assist those teachers who were unaware of the term, although they may practise the training of executive functions in lessons.

Consequently, I first approached the participants to inform them about the intentions of the study, the importance of carrying out this work and my reasons for conducting

the study. By informing the participants on what the investigation of executive functions would entail, their ideas surrounding the topic were broadened so that I could gather more information on what they understood regarding executive functions. Once the participants agreed to participate in the study, a date was scheduled to conduct the interview and to observe a class lesson. The interviews were conducted in the teachers' classrooms after school hours for a period of 45 minutes. Furthermore, the conversations of the interviews were recorded by voice recorders and later documented into transcriptions.

One of the basic elements of interviews is a set of pre-set questions (see Appendix A), which permits the researcher to explain the answers provided by participants (Nieuwenhuis, 2007:87). Semi-structured interviews, for example, enable participants to express their views freely since the questions are open-ended (Harding, 2013:22 and Page & Meyer, 2000:112). This requires the researcher to take note of the responses so that newer questions may assist with solving the research problem (Nieuwenhuis, 2007:87). Other factors that enable effective interviews include the following: having the right participants to provide information, mentioning the objective of the interview, guaranteeing the collection of rich data and posing questions effectively (Nieuwenhuis, 2007:88).

Being the interviewer, I asked specific questions to permit the chance to direct the retrieval of information (cf. Creswell, 2012:218). This also provided the participants with the opportunity of explaining their experience with regard to implementing executive functions in Grade R. Although pre-set questions were formulated for the interview, I asked further questions to discuss their views openly (cf. Clasquin-Johnson, 2011:87). I then proceeded to transcribe all of the interviews with the participants after they had occurred.

3.3.3.2   Observation

According to Seabi (2012:91), "observation" is defined as a method of gathering data where the researcher notices and perceives information through his or her senses. The researcher, however, does not interfere or converse with the observed group but is simply present in the setting to note and capture information that pertains to what is being investigated. Furthermore, Litchman (2013:165) states that "observing humans in their natural setting assists our understanding of the

complexity of human behaviour and interrelationships among groups" – this is particularly useful for empirical studies since observation assists the researcher with capturing authentic data in the participants' natural setting.

Of the various forms of observing, I opted to conduct non-participant observation to permit me the researcher, to follow and comprehend how Grade R learners perceived and responded to developing their executive skills (cf. Harding, 2013:21). Under this observation, I the researcher watched my participants and their learners without taking part in their lesson-activities. Hence, I conducted the observations for my study for a period of three hours each. An observation schedule was used for the responses of the teachers and the learners (see Appendices B and C). By observing teachers and learners during a lesson, I got to make comparisons in order to determine if the participants had similar or different experiences when teaching and implementing executive skills. Furthermore, I obtained the means to note the participants' unique styles in developing executive skills.

3.3.3.3   Field notes

The observed notes of a research study, according to Cohen et al. (2005:146), are detailed in field notes. Because these notes are based on observations, field notes document what is apparent or highlighted during the observations of participants. Cohen et al. (2005:146), explain that field notes are written descriptions that contain a certain standard of explanation, such as written descriptions and reports; these are based on the event and the behaviour of the participants. Furthermore, Cohen et al. (2005:146), state that field notes can either be detailed at the research site or outside of it. The reason this is done is because it permits the researcher continuously to note down the detail of what transpires during the observation. Schwandt (2015) affirms that field notes are the added research proof that cultivates meaning and understanding of values, societal contexts and phenomena being investigated, which allows the researcher to obtain answers to the research question. Thus, the field notes in my study added depth to the observations and the interviews conducted in the study.

According to Corbin and Strauss (2015:36), "at the inception of a project, it is important for a researcher to initiate a research journal or diary in which he or she keeps record of all the activities present and future that transpire during the research

process." Hence, in my study, I made use of a journal over the period of the observation to reflect on the teacher-learner interaction, as well as descriptive notes on how executive functions were being incorporated into lessons. The aim of using a journal is to provide detailed descriptions or responses that add information to the field notes (Creswell, 2009:180).

3.3.4   Data analysis

Once the data have been obtained, the next action for the researcher is to analyse the content of the data. As noted by Cohen et al. (2011:537), qualitative data are preceded by an inductive process where the researcher must arrange and deduce meaning from the gathered data by establishing themes and orderliness. Maree (2016:109) discusses how the themes in the data highlight descriptions, comprehension and the interpretation of the information obtained. Taken together, these aspects all play a vital role in developing the meaning of the phenomenon. Nieuwenhuis (2007:99) confirms the outlook of Cohen et al. (2011:537), that data analysis in qualitative research amalgamates the experiences and descriptions of participants to formulate a meaning of the phenomenon.

Furthermore, the process of data gathering and evaluation, according to Maree (2016:111), is a continuous and sequenced phase. Here, the researcher encounters the iterative nature of the research to sharpen and then cultivate meaning. Hence, data analysis in this context pertains to developing a meaning and sense of the information obtained from the participants of the study. Creswell (2009:185) provides a guideline on how to analyse data in research. I made use of this blueprint as a structure to direct the analysis and interpretation of the data in my study. Below is an illustration of this eight-step process.
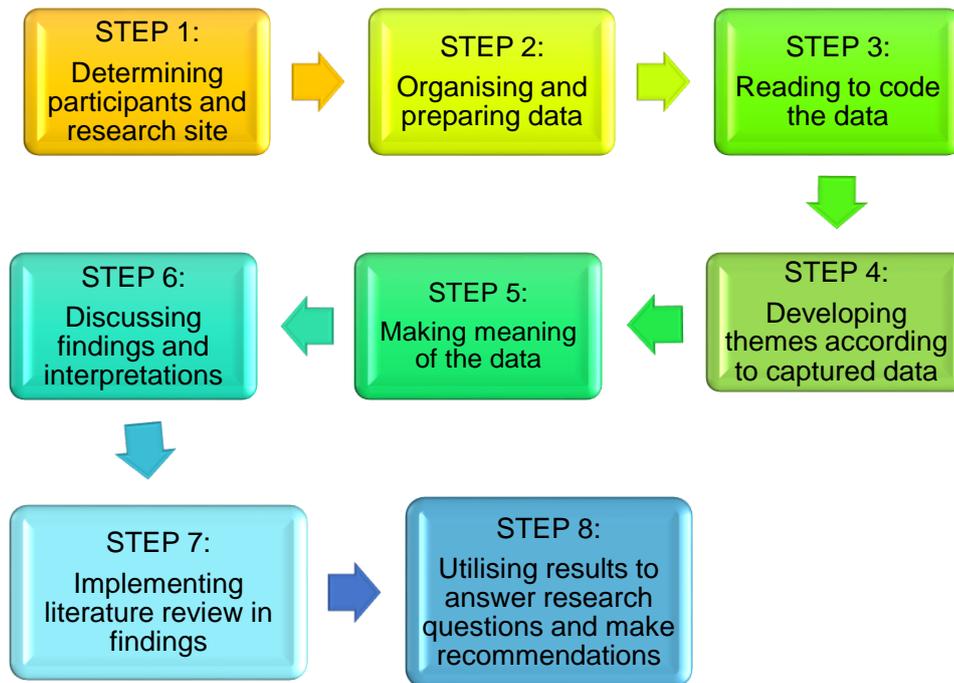
Figure 3.2:   Eight-step data analysis process

Source: Adapted from (Creswell, 2009:185; McMillan & Schumacher, 2006:368 and Nieuwenhuis, 2007:103)

The eight steps I have followed in the data analysis process (as depicted in Figure 3.2) are discussed:

- According to Nieuwenhuis (2007:103), the first step to perform involves debriefing who the participants are and what the site is. My study consisted of eight participating Grade R teachers who worked in private schools. The Grade R learners were indirect participants because they were observed during the lessons in class. Nieuwenhuis (2007:103) adds that a description of the participants is vital for understanding the context, nature and phenomenon of what is being studied.

- The next action would be to organise and prepare the data. In my study, this entailed transcribing the interviews. According to Nieuwenhuis (2007:104), the researcher is the most suitable person to transcribe his or her own interviews as this permits the researcher to add nonverbal cues experienced or observed during the session. Niewenhuis (2007:104) furthermore advises that every word should be transcribed as it could contain vital details. Lastly, field notes of the observations should be added to the analysed compilation.

- Once the data have been captured and organised, the researcher is required to read through the information multiple times to gather comprehensive knowledge about the content (Creswell, 2009:185). According to Maree (2016:112), a well-read text enables the researcher to comprehend the data to interpret the meaning thereof better. Furthermore, he advises utilising journals and making reflexive notes in order to engage in depth with insightful knowledge. After I had made essential notes from reading the data, I coded both the transcribed interviews and observation notes into themes (cf. Creswell, 2009:185).

- The fourth step includes utilising codes to develop subtopics in the study. Here, the researcher is able to note and gather information that concerns or is similar to the theme. Furthermore, because my study had a small number of participants, this enabled me to group the data according to settings, situations, perspectives and activities (cf. McMillan & Schumacher, 2006:368). In my study, for example, recurrent details were noted as significant themes. Lastly, categorisation of these themes was done to ensure that no significant detail was being left out (cf. Nieuwenhuis, 2007:110).

- The fifth step in data analysis involves interpreting the information (Creswell, 2007:156). Here, a summary can be provided to reflect unique perspectives on meanings (Creswell, 2007:189). Drawing conclusions, according to Nieuwenhuis (2007:112), is the final objective after reaching the findings in a study. Such conclusions permit other questions to surge (Creswell, 2007:190).

- The next step of analysing data includes the writing of a report. In this section, a detailed explanation of activities and the knowledge gained need to be given. The themes and codes identified should assist the researcher to reach analytical findings and obtain answers to the research questions.

- These findings will then be compared to the literature to identify similarities and differences.

- Lastly, I will conclude my study by stating the results in order to answer my research questions. I will also make recommendations for educational policies, teachers, parents and future studies.

Consequently, the above section entailed research methods that discussed how and where the data for this study will be gathered. Moreover, the selection of the participants in my study, their sites and the selection criteria were all discussed.

Thus, in the next section, trustworthiness will be elaborated detailing how my study aims to entrust credibility and objectivity in my research.

3.4   TRUSTWORTHINESS

According to Hogan, Dolan and Donnelly (2009:7), the way a researcher approaches the study may be subjected to his or her personal opinion. This is because, in discussing the findings and interpretation of results, researchers may be tempted to apply their own understanding of matters (Corbin & Strauss, 2015:46). Hence, Hogan et al. (2009:7), emphasise the need of researchers to remain objective by carefully examining their attitudes as these may impede the dependability of the study. This is where trustworthiness arises: trustworthiness is regarded as the "acid test of your analysis, findings and conclusions" (Maree, 2016:123). This is because trustworthiness "portrays the quality of your inquiry process and product" (Schwandt, 2015:299). To summarise both these quotes, trustworthiness is deemed as the systematic method that determines the truth and the competence of a study by using different methods to inspect its data.

The literature indicates how researchers (in qualitative studies) have to inspect the credibility, transferability, dependability and confirmability of the study, being that these aspects embody the trustworthiness of a research study (Denzin & Lincoln, 2005 and Maree, 2016:40). Hence, in this section, I will discuss the four aspects that form part of trustworthiness, and how I accounted for them in my study. According to Marshall and Rossman (2016:43), trustworthiness is deemed to be significant in research studies because it guarantees reliability and truthfulness within empirical research. The following elements of trustworthiness will thus be discussed: credibility, dependability, conformability and transferability.

3.4.1   Credibility

Credibility is noted as a vital aspect of a research study because it determines how truthful the findings of the study are to the participants' realities (Merriam & Tisdell, 2015:213). Unlike other aspects of trustworthiness, credibility has the most conductible techniques; this means that studies have a better chance to prove credibility than other trustworthiness aspects. Hence, to ensure credibility in my

study, I utilised different data collection techniques to allow triangulation to occur (cf. Maree, 2016:42).

According to the literature, triangulation is the use of various methods, sources and theories to gain an in-depth understanding of a phenomenon. Furthermore, it also ensures that the research findings are abundant, vigorous, thorough and well developed (Maree, 2016:40, 121). In my study, I used various methods, such as interviews and lesson observations, to gain an understanding of the phenomenon being studied. Apart from using triangulation as a source of credibility, I also utilised member-checking (cf. Creswell, 2007:191), which Nieuwenhuis (2007:114) explains allows participants the chance to view the data, interpret the data and reach a conclusion of the study. This is to permit the participants to explain their meanings, correct any mistakes and provide more information if needed. According to McMillan and Schumacher (2006:326), the process of member-checking can be done by having follow-up interviews, requesting participants to comment on the results or simply having normal discussions in casual settings.

3.4.2   Dependability

The second aspect that embodies trustworthiness is dependability. Dependability relates to "the stability of findings over time" (Bitsch, 2005:86). In this process, the participants are involved during the analysis of the results and the provision of explanations and recommendations to ensure that they agree with the information that has been obtained. Dependability is thus a logical, traceable and consistent "data-capturer" (De Vos, Delport, Fouche & Strydom, 2011:420) that permits readers to follow and understand the research process. Researchers and participants in different settings, for example, can utilise the same technique in order to change or improve a similar learning problem (Miller & Glassner, 2004:285).

In my study, dependability was ensured by recording interviews and noting field notes through observations (cf. Creswell, 2016:85). Furthermore, this data collection process was noted in an audit trail. An audit trail, according to Bowen (2009:305), constitutes all of the research decisions and activities pertaining to the recording, collecting and analysis of the data. I also had an external overseer (my supervisor), who analysed the reliability of my procedures, my data coding and the written conclusions that had been drawn from my study.

3.4.3 Conformability

Conformability pertains to the inclusion of an external evaluator to analyse the research findings (Creswell, 2007:192). According to Tobin and Begley (2004:392), the reason this is done is to ensure that the "data and interpretations of the findings are not figments of the inquirer's imagination but are clearly derived from the data." This alludes to the unbiased capturing of data, where other researchers can verify its inquiry by performing a similar investigation (De Vos et al., 2011:421).

In my study, I first sought to incorporate conformability by primarily analysing and studying the works of academics who had written about executive functions, learning and school readiness; this step is demonstrated by the extensive literature reviewed. The knowledge and recommendations of these expert academics were incorporated in my own study. Secondly, because De Vos et al. (2011:421), state that the involvement of external auditors helps to analyse a research inquiry better, my supervisor performed this task in my study. As auditors inspect whether the methods and procedures of the study are well-explained, this evaluates the strong points and weaknesses of the study. Considering the importance of external evaluators, at the completion of my study, external examiners review my dissertation to assess the output of my work.

3.4.4 Transferability

Mertens (2014:430) describes transferability as "the extent to which the findings of one study can be applied or generalised to other situations" by other inquirers. For this to occur, all aspects of the study need to be detailed thoroughly as it permits evaluators to check if the findings are applicable to other settings. According to Bitsch (2005:85), the two ways by which transferability can be strengthened are by including thick descriptions and conducting purposeful sampling. I made use of both these techniques to guarantee the transferability of my study.

Beginning with thick description, Anney (2014:278) asserts that "to enable judgments about how well the research context fits with other contexts, thick descriptive data, i.e. a rich and extensive set of details concerning methodology and context, should be included in the research report." Thus, thick description relates to how a researcher details the research process by thoroughly explaining the tools

that have been used to collect the data, describing the research site and communicating the findings. Furthermore, thick description allows for other researchers, who experience similar problems, to duplicate the study in a different setting. In my study, thick descriptions will be provided by detailing the methods and tools utilised to gather the data. According to Harding (2013:16) "the aim of the case study should not be to generalise but to contribute to theory." Hence, in my study, the results will only be applicable to the participants in this study and will not be generalised.

The second tool of transferability pertains to purposeful sampling. Purposeful sampling ensures that the participants who have been chosen are well suited to provide information with which the research questions can be answered (Creswell, 2016:109). According to Teddlie and Yu (2007:77), the "units (e.g., individuals, groups of individuals, institutions) are based on specific purposes associated with answering a research study's question." Purposeful sampling is narrow-focused since it helps researchers concentrate on participants who are well informed on the subject (Creswell, 2016:109 and Schutt, 2006). The knowledgeable participants in my study added greater depth to the findings of the study as they were experienced Grade R teachers.

3.5   ETHICAL CONSIDERATIONS

Since gathering data in qualitative research can often turn into an unpleasant experience, Maree (2016:44) encourages the use of ethical measures to ensure the protection and wellbeing of the participants. According to Schwandt (2015:89), "ethics is the justification of human action, especially as those actions affect others." Furthermore, Johnson and Christensen (2012:99) deem ethical considerations to be procedures that safeguard participants to be respected and treated appropriately. Since researching implies divulging personal information and experiences, it is vital that an ethical procedure is followed (Corbin & Strauss, 2015:43). Hence, the initial step in conducting my research began with applying for ethical clearance from the Ethics Committee of the University of Pretoria. Only after having obtained approval to proceed with the study, I approached the schools to participate. The ethical guidelines I included in my study are discussed below.

Prior to commencing with asking questions, I obtained permission from the participants to use a voice recorder and take notes from lesson observations. I finalised the interview by thanking the participants for participating in the study and assuring them that their anonymity will be maintained in the responses they had provided. Lastly, I informed the participants that the results of the study would be made available to them (cf. Creswell, 2012).

3.5.1   Informed consent

Before I started to gather the data for my study, I approached the prospective schools that I wanted to include in my study. They allowed me to extend invitation letters explaining the overview, purpose and procedure of my study (cf. Corbin & Strauss, 2015:44). The three groups who were provided with the consent letters included the school principals (see Appendix D), the participating teachers (see Appendix E) and the parents of the learners who would be observed (see Appendix F). This was done to inform them about the purpose of my research and to notify them of their anticipated roles as participants (cf. Corbin & Strauss, 2015:44). It was stated clearly in the letters of informed consent that the participants had the right to decline to participate should they have no interest in the research and there would be no consequences as a result (cf. Gajjar, 2013:12).

The consent letters asked permission to interview Grade R teachers and observe their lessons. It furthermore detailed how the identities of the participants and the schools would be kept anonymous (cf. Harding, 2013:26). Pseudonyms were used to protect the identity of participants. Secondly, the informed consent detailed that voluntary participation would be maintained; this meant that should participants wish to withdraw from the study, they would be under no obligation to continue (cf. Clasquin-Johnson, 2011).

According to the literature, other technical aspects needed in a consent letter include informing the participants in advance on the data collection instrument that would be used, the period the gathered data would be kept, the storage site and how the data would be destroyed after the duration period had elapsed. These matters were all addressed in my consent letter. I concluded the consent letter by indicating the benefits that the teachers would obtain from participating in the study and affirming

how the empirical study would contribute to my dissertation on executive functions (cf. Corbin & Strauss, 2015:44).

3.5.2   Anonymity and confidentiality

When participating in a research study, Corbin and Strauss (2015:45) advise that researchers are called to protect the identities of their participants and the information obtained from them. This can be done by enforcing anonymity and confidentiality.

The term "anonymity" indicates that the information obtained can in no way demonstrate any relation to the person who has provided it. This implies that when participants disclose information, their identities are hidden from revealing who they are (Johnson & Christensen, 2012:116). Gajjar (2013:13) further states that participants at this point can freely decide the amount of information they want to disclose about themselves. With confidentiality, however, the information providers are known to the researcher. Although the participants are known to the researcher, the information, however, should still be kept private (Harding, 2013:3). This according to the literature, can be done by using codes or false names. Since the interviews in my study occurred face to face, the participants' identities were inevitably revealed to me consequently ruling out the subject of anonymity. I still as a researcher, had to be cautious with the information entrusted to my care; this meant that I could not divulge the information obtained with people outside my study (cf. Johnson & Christensen, 2012:116). Hence, in my study, confidentiality was firstly upheld through the use of pseudonyms; and secondly, I conducted the interviews with the teachers in a setting where only the relevant participants were present.

3.5.3   Protection of participants

It is essential that a researcher ensures the safety of his or her participants and keep them from "physical and psychological harm" (Maree, 2016:300). This suggests that the researcher needs to refrain from causing any discomfort by humiliating, upsetting, insulting or hurting those people involved in the study. According to Babbie (2004:68), the disclosure of information can often have an impact on working relations and embarrass people; thus, researchers need to approach the inquiry of

information with the utmost caution and respect not to have conflict develop in the study.

In my study, prior to proceeding with the interviews, the participants had to indicate their willingness to participate in the study (cf. Corbin & Strauss, 2015:44). This allowed us to discuss what would happen during the interview and to establish whether they agreed to its proceedings by signing the consent form. Doubts and questions relating to the interview were addressed at this point. I also informed the participants of their voluntary participation. This meant that if any of the participants wished to withdraw at any point during the study, they could do so without any consequence (cf. Corbin & Strauss, 2015:44). The interviews occurred after school hours, while the observation of lessons took place during lesson periods; this was to ensure that the study would not interfere with the teachers' working occupation. Pseudonyms were used to protect the identities of the participants and their schools; the data gathered were kept private, as mentioned in my ethics application (cf. Harding, 2013:26). Lastly, the participants were protected by gathering the research data in a setting in which they felt comfortable.

3.6   CONCLUSION

In this chapter, the research methodology that has been utilised to investigate empirically what teachers' understanding of executive functions are and how they implement these in Grade R was discussed. Being guided by the qualitative research approach, a case study was utilised to execute an in-depth investigation into the phenomenon. The qualitative methodology proved to be effective in that it provided rich data that were verified through my use of various data collection tools; this solidified the understanding, construction and explanation of executive functions. Furthermore, purposeful sampling was applied to specifically select the participants (Grade R teachers) whose contributions assisted me with answering the research questions. I also obtained information on how Grade R teachers adapt their learning environments to make provision for the teaching of executive skills. In the next chapter, the data will be analysed and interpreted.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

4.1   INTRODUCTION

The purpose of Chapter 3 was to present the research design and methodology used in my study. Since the study was aimed at exploring teachers' perceptions and understanding of executive functions, the data collection instruments that were used included semi-structured interviews, lesson observations and field notes. The interviews with the participants were recorded on an audio recorder, and the lesson observations were documented in an observation checklist and a journal, after which the data were analysed. The emerging themes and categories from the analysis were used as guidelines for the interpretation of the data. Chapter 4 outlines the way the data were collected, coded, grouped into themes and categories, then analysed and finally interpreted.

4.2   DATA ANALYSIS

Data analysis, according to Corbin and Strauss (2015:81) is defined as "the act of interpreting data for meaning." Interpretation for meaning, in this context, implies that the researcher takes apart the data (Harding, 2013:4). In doing so, the researcher goes through a thought process to identify concepts based on grouping properties according to similar traits or matching characteristics. Concepts are deemed to be crucial in data analysis because they form the basis with which to communicate meanings, and meanings in research study equate to identifying the research results (Corbin & Strauss, 2015:68). The following subsections present the coding of the participants, the description of the participants, the interview data and the lesson observation data.

4.2.1   Coding of participants

In ensuring the protection of identities and personal information, the names of the participating teachers and schools were branded according to codes. The school sites, for example, were coded as S1, S2, and so forth, whereas the participants were coded as T1, T2, and so forth. Also, the names of the learners mentioned during interviews were omitted and changed into pseudonyms in the typed transcripts. Table 4.1 depicts all the codes of the participants and the school sites.

These codes represent who the speakers are and the information they provided to answer the research questions.

Table 4.1: Codes of the participants and sites of the research study

School	Participants	Transcription code	Observation of teacher	Observation of learners
S1	Teacher 1	T1	TO1	LO1
S2	Teacher 2	T2	TO2	LO2
S3	Teacher 3	T3	TO3	LO3
	Teacher 4	T4	TO4	LO4
S4	Teacher 5	T5	TO5	LO5
	Teacher 6	T6	TO6	LO6
	Teacher 7	T7	TO7	LO7
	Teacher 8	T8	TO8	LO8

In S1 and S2, one out of the two Grade R teachers of each school participated in the study; this was due to the availability of teachers in each school. In S4, however, four of the five Grade R teachers participated in the study due to the permission granted by the principal. Furthermore, all four of the selected schools are situated in affluent areas and, therefore, rich in learning resources. Because the schools are privately owned, they are governed by their own regulations, which enabled me to explore how the schooling environment of each supports the development of executive functions. All interviews were scheduled beforehand, with the observations conducted after the interviews had taken place. The next section will detail who the participants in the study were.

4.2.2 Description of participants

The participants were primarily selected based on being current Grade R teachers due to the exposure they have to Grade R learners. The other added criteria for selection included:

- being first-language English teachers;
- being qualified teachers with degrees or diplomas; and

- having a minimum teaching experience of four years.

The following table presents an overall description of the participants that include their interests, qualifications, and number of years in teaching.

Table 4.2:   Description of the participants in the study

Participants	Brief description	Qualifications	Number of years teaching	Language of instruction
1	The participant has published numerous literature textbooks in primary schools in South Africa and developed a reading programme for schools in South Africa.	Bed Foundation Phase B Sports Science and Management	5	English
2	She is a junior school teacher who has been teaching for 18 years, she also taught for two years in a Montessori Preschool. She has experience in teaching Grade 1 and Grade R. The participant teaches because she believes in helping children to develop to their full potential in a structured and supportive environment while having fun.	B Prim Ed	18	English
3	She is enthusiastic Grade R teacher. She chose teaching as a profession because growing up, the school had supported both her and her brothers beyond the call of duty. Hence, she too would like to create a safe and happy place for children in need. She is a long-life learner, who makes it her mission to change with her.	Bed Foundation Phase Bed Honours Curriculum design	8	English

Participants	Brief description	Qualifications	Number of years teaching	Language of instruction
	classes and often allows them to take the lead.			
4	The participant started studying BA Sociology with a project, but then decided to change to teaching. She describes herself as a natural teacher who is creative and likes to adapt her lessons. She has been teaching Grade R for five years.	BA at the University of Pretoria, B Prim Ed, Unisa (Intersen)	18	English
5	She loves working with children as she states that there is nothing quite like the look on a child's face when they learn or grasp a new concept. She has been teaching Grade R for five years.	B Ed Early Childhood Development and Foundation Phase ABET Level 1-4	10	English
6	This participant is passionate about equipping children with the skills they need in order to function in the world. Furthermore, she has been teaching Grade R for 21 years.	B Prim Ed (Pre-primary)	21	English
7	She describes herself as well-organised with a kind heart. She educates children who are five turning six. Teaching has always been a calling for her. She enjoys supporting and teaching children and keeping up with the new ways of teaching. She strongly believes there is no right or wrong – everybody's ideas are welcome. She has been teaching Grade R for six years.	B Ed Early Childhood Development & Foundation Phase	21	English

Participants	Brief description	Qualifications	Number of years teaching	Language of instruction
8	She is passionate about enriching the lives of children by finding ways to encourage the learning process in new and innovative ways. Participant 8 has been teaching Grade R for six years.	B Prim Ed (BEd)	9	English

4.2.3   Interview data

Corbin and Strauss (2015:66) point out that when a study seeks to explore a phenomenon, it implies interpreting the understanding of personal ideas. The structured interviews, for example, are one of the known through by which in-depth meanings of personal experiences can be obtained (Harding, 2013:33). Hence, the participants were provided with the opportunity to divulge their interpretation of executive functions, which was recorded with an audio recorder. The interview questions were structured to probe how teachers understand and implement executive functions during lessons. Furthermore, added questions in the interview explored the current cognitive and behavioural functioning of Grade R learners during lessons; this was done to demonstrate some of the challenges teachers face when trying to develop executive functioning skills. The following subsections comprises both the questions posed and the answers provided during the interviews with the Grade R teachers.

4.2.3.1   What is your understanding of mental skills?

Beginning with the first question, I asked the participants to explain their understanding of mental skills. My reason for posing this question was to clarify the topic sufficiently for the participants to feel at ease. Furthermore, the term "executive function" is not widely known among educators, hence I had to utilise a comprehensive term that covers executive functions.

According to the responses, T1 believes that mental skill is "*everything that goes on in your mind; the way that they process things.*" Here, the participant focused on the cognitive aspect of mental operations. The cognitive function is crucial to executive

functions because it regulates all operations of the mind plus people's behaviour. Furthermore, T1's answer was similar to those of T7 and T8, as they too described mental skills as a cognitive process. T3 mentioned that mental skills form part of *"things that you're doing that you have to think of or reorganise in your mind, and a lot of the time [it's done] spontaneously."* T3 addressed the ability to reorganise the cognitive frame; this highlights metacognition – thinking about one's own thinking. Metacognition is a mental skill that relates to executive functions. Hence, this response indicates that mental skills are identified as executive functions. T2, however, identified mental skills as the *"ability to carry out the function or the activity; putting it all together so that you come out with a result."* T2's answer was unique in that it emphasised an output response – mental skills do not only operate in the present moment, but they also bear in mind an end goal. T4, however, understood mental skills as a –

> … memory and then execution of instructions; remembering the sequence of instructions and then being able to do it; understanding what you're supposed to do and seeing how to execute it …. Mental skills is also understanding your environment - as you said, an appropriate behaviour for a certain activity.

T4 provided examples in her interpretation by stating that mental skills entail the ability to analyse the environment in order to attain an objective. T4's meaning of mental skills covers the whole body of executive functions in that T4 added memory and self-regulation skill in her answer.

Consequently, the participants' definitions of mental skills were very similar to the interpretation of executive functions. Moreover, the participants shared different angles in their understanding of how mental skills operate. By describing mental skills in different ways, the level of understanding of the participants was revealed, as well as the depth of the concept.

4.2.3.2   Why do you think mental skills are important for learning?

The reason for asking this question was to determine whether teachers are aware of the importance of mental skills in learning. Furthermore, I wanted to explore why

they believed mental skills are vital for learning and for school readiness. T1's response, for example, served to be quite impressive –

> … you can't process anything; you can't learn. I think they are fundamental skills that are vitally important and if a child doesn't have those, later on they battle – and not only do they battle; their teacher battles; the children around them battle; and other skills like their social skills become avenues that [children] either excel in or become problem areas.

T1 highlighted how a single learner's problem can affect the rest of the class. She exemplified a ripple effect that can occur – if a learner lacks the necessary mental skills, both the learner's cognitive and social functioning will be affected. Therefore, mental skills play an important role in school readiness. T5 also referred to the required skills needed to adapt to and function at school. She discussed her understanding by stating that learners would need to be able to "*concentrate; they need to listen and remember what's being done. They have to organise themselves within the classroom environment and then decide how to tackle activities … basically remember what's being taught and implement the skills.*" T5's response embodied the executive requirements learners need to have to function effectively in a learning environment.

T2, however, believed that it is "*something to base your new learning on and grow in what you do so that you have a basis, add to it, and get a final result.*" Here, T2 shared her thoughts on mental skills as the learning basis that enables other learning opportunities to occur. T2's response is similar to that of T7, as both mentioned:

> … it's the fundamentals of learning. Uhm ... if they don't have the adequate mental skills to take in the information and process it and uhm ... put it out into the activity or onto the paper, uhm ... then it's going to hamper their ability to complete any tasks.

Hence, both T2 and T3 identified the significant role mental skills play in learning as these help learners perform their tasks. T3 added to this point by stating that "*it's the most important thing for learning … I think in order to learn you need to be able*

to problem-solve and to look at a situation from a different angle." What is unique about T3's response is that it emphasised cognitive flexibility under executive functions; thus, learners are able to learn since their cognitive flexibility enables them to problem-solve.

Lastly, for T4, mental skills are important because it prepares a learner –

> … for lifelong learning; your child must be able to go into the higher grades. I'm teaching them now how to memorise things … how to listen to an instruction so that when it gets to a certain age, then he actually has to go and sit to learn by himself.

T4 recognised that learning does not only occur at school – learning is a long-term process that is continuing even into adulthood. This interpretation relates to how school readiness prepares learners for lifelong learning careers. In essence, the responses obtained demonstrate how knowledgeable teachers are on the importance of mental skills. Furthermore, they mentioned that these skills help learners to succeed at school.

4.2.3.3   What is your understanding of the following:

i.   Self-regulation
ii. Working memory
iii. Cognitive flexibility

My reason for selecting these specific constituents is because all three were discussed in my literature review as the elements of executive functions. Furthermore, these three components form the anchor of my study. Hence, beginning with self-regulation:

Self-regulation according to T1 implies the following:

> … a child would know okay, well they need to be quiet now because we are sitting in circle time, or we sitting at the table where we need focusing; so, they understand the way they are processing themselves and the way they're interacting with society.

In addition, it is the ability to "*organise your body, control it and then put it forward into the next task*" (T2); this entails using one's body to reach an end goal or knowing how to use the body to perform specific tasks. T3, however, believed it entails –

> … adjusting to what's going on around you; perceive difficulties that the learners will maybe come across and also to be able to adjust …. When speaking, they use their words to find out what they are feeling instead of just bursting out.

T3's response relates to that of T4, where self-regulation is seen as dealing with the *"emotional side of things, so regulating impulsive behaviour"* (T4). Both the interpretations of T3 and T4 encompass the ability to control people's actions, especially when it is not beneficial or kind to others. Self-regulation also means to "*get yourself into sort of the right frame of mind and tone; being able to stop and take a step back and just sort of see where you actually meant to be; focus on something"* (T5). Nevertheless, one of the most important abilities would be *"to not follow what everyone else is doing but to control yourself and assess the situation and react appropriately and not to forget about what you need to be doing"* (T6); hence, self-regulating also involves the ability not to be influenced by peers. Regardless of the surrounding distractions, it is about keeping one's objective in mind. During the interviews, the teachers described self-regulation in the form of an example; I believe this occurred because Grade R learners tend to misbehave; hence, the participants discussed what self-regulation means by referring to what the skill should entail.

The working memory, however, deals with referring …

> … back to what you learned previously, learned from previous experiences and apply that ... uhm … using those memories to work for you, you know and to also build on the memory – the working memory; you're building on the memory adding things to it to enhance your learning (T6).

It also entails …

> … learning new skills and things like that, and working with your memory. But it's also being able to embed enough that I'm not just doing it today

for the sake of doing it to get through today and it's done … refer back to what you have learnt and maybe use it in a new context or a new way uhm ... to enhance what you are learning, uhm or enhance the skills (T5).

One of the unique traits of working memory consists of "*building on, constantly building on uhm … ya so what you already have – the basics and building onto it all the time"* (T8). T4 used an example to elaborate on the idea of how working memory operates: "*my lessons are worked out this way that everything I do, I do first, second, and third, fourth …."* In this stance, the participant explained how a structured lesson would typically occur in the form of a sequence. T4 went on to state that she has to "*repeat [the steps] and [learners] have to do everything from the beginning of the year [learning routines the teacher has taught her learners]. You have to do the instructions in that sequence that I've given to you."* Hence, T4 summarised that the working memory is an arranged system that allows learners to know what they should do in a lesson; moreover, the learners have to build onto the acquired knowledge to perform the tasks correctly.

Lastly, cognitive flexibility was explained by T2 as "*being able to adapt to [a] new situation; being able to put it all together again."* This interpretation applies to establishing a new thinking frame or adapt one's thinking pattern. Furthermore, a learner would need to "*understand if something is not working and to try a different way or to rethink it"* (T3). T3's interpretation is similar to that of T7, as she mentioned that "*cognitive flexibility would be to be able to change if a situation – say now I'm unable to cut this out, what else could I use to change it?"* Interestingly, both T5 and T6 deemed that cognitive flexibility entailed "*more critical thinking than the creative thinking*" (T5); this is because cognitive flexibility implies "*realising that some situations I won't be able to solve it this way so you have to try other methods …. Thinking out of the box uhm ... thinking a bit deeper than just the normal surface thinking"* (T6). The participants also noted that teachers need to be aware of different mental capacities and develop the lessons according to various learning skills – "*so for the teacher, uhm ... cognitive flexibility would be to be able to recognise different levels of ability, and then to be flexible in your lessons"* (T4). Furthermore, "*teachers [need to] be flexible enough to acknowledge the way a child learns and teach them in that way … auditory, visual, facial …. The mind [needs] to adapt to different things"* (T1). Thus, T1's interpretation of cognitive skills adds how

teachers can incorporate different teaching techniques to promote cognitive flexibility in lessons.

The general response for the third question reveals that the teachers' understanding of executive functions fall in line with what is mentioned in the literature (see Section 2.2). Moreover, the participants' answers demonstrate how executive functions can occur differently in everyday situations. Some of the participants identified the executive functions in how learners are expected to behave; the reasons for this could be due to the fact that learners do not behave in ways teachers expect them to.

4.2.3.4 What is your view of the Grade R learners' cognitive and behavioural functioning during lessons?

With this fourth question, I wanted to understand how teachers experience the cognitive and behavioural functioning of Grade R learners and explore if the learners are using their executive function skills during lessons. In doing so, I would be able to identify which of the skills are present and which are absent when learning. Furthermore, I wanted to investigate how learners integrate their cognitive and behavioural skills, in other words, how learners analyse possible actions before responding. Cognitive functioning relates to mental processes that assist learners to recognise, analyse and process information. Behavioural functioning, however, pertains to the way learners physically respond or interact during the lessons. In the gathered responses, T2 shared that …

> … [learners] are not fully in control [of cognitive and behavioural skills], and they have no concept that [cognitive skills] all relates to how they behave … [Learners struggle] to take on board and manipulate [actions and information] in their brain. It's a case of getting [learners] into our system – getting them used to understand that they can't just run riot, we have rules and boundaries and so on.

At this point T2 explained how learners cannot do as they please at school – learners at this stage should be able to regulate their behaviour. What happens is that often learners fail to realise how their cognitive skills affect their behaviour. T2 justified this example as she mentioned how weak cognitive skills can affect learners'

behavioural control. Without the ability to analyse their actions in a setting, learners fail to regulate their behaviour and respond appropriately.

T3, however, was of the opinion that –

> … cognitive functions [of Grade R learners] is [sic] very different even though they are the same age; they get excited if it's something they like and then if they're bored, they'll tell you that as well, and you can see (laughs) …

T3 expressed that cognitive and behavioural challenges of Grade R learners are dependent on their mood; this response highlighted how emotions play a great role in managing learners' behaviour during lessons. Similarly, T4 expressed that with "*behavioural, it depends: If you have an activity like music and physical activity, of course you have them more excited and lively … you have to use different tools to bring them back to be able to listen.*" Both T3 and T4 emphasised learners' emotions as the determining factor of cognitive and behavioural functioning: learners' emotions are 'steering wheels' that determine the level of attention or participation.

T7 revealed:

> … children these days, they basically get distracted with things around them, and they forget to actually to do all those processes in their mind; they are basically like daydreaming a lot and they get distracted with things around them, and I think it all has to do with people not actually talking to them anymore, they don't need to listen …. They are prone to playing on the iPad and sitting in front of the TV, they [technology gadgets] sort of have become the babysitter.

T7 highlighted the various factors that thwart children's cognitive functioning at home and specified that technology and parents themselves can unknowingly weaken their children's cognitive thinking skills. This is why teachers find that learners "*tend to zone out almost*" in class (T8).

In opposition to the above negative outlook, other participants shared positive reviews. T1 for example, shared that Grade R learners …

… have high potentials, extremely high potentials; I think that their behaviour is quite advanced …. We think that they can't do it but actually they can, so their abilities – their cognitive abilities are extremely advanced. Actually, we just need to feed that …. I think it also depends on the environment.

Furthermore, T3 revealed that she had "*a very good experience with cognitive and behaviour level functions [of learners]. They respond well in lessons especially if it's something that they're excited about or that they want to know more.*"

Consequently:

> … cognitively, a lot in grade nought is happening: there's a lot of growth, a lot of new things they are learning, a lot of skills, a lot of preparation for grade one …. Behavioural side as well, they're maturing a little bit, they are finding themselves in the environment within a group situation. They're learning how to become little bit bigger and getting ready for big school; they're testing their boundaries (T6).

Thus, the teachers' experience of Grade R learners' cognitive and behavioural functioning was explained by both positive and negative reviews.

4.2.3.5 Have you experienced any cognitive and behavioural challenges that impede learning in the class?

The reason for my asking this question was to identify specifically the cognitive and behavioural challenges experienced in lessons. This question also gave me an indication of the executive function skills teachers are struggling to develop in class. T1 shared that –

> … actually even today, we had a little situation where this little boy – he's quite emotional … uhm ... but I just think it's a behaviour that has been learned because at home, if you're emotional and cry, you get something [what the child desires].

T1's response relates to behavioural challenges. T2, however, felt that because "*language is a hard thing to begin with and that it takes a lot longer to teach in classroom,*" this then affects the learner from engaging in the lesson. Language

barriers pertain to cognitive challenges since languages are information tools that enable people to communicate their ideas or needs. T2 gave an example where she has "*a little girl who has no English, from another country – a foreign country.*" In helping this learner, the teacher is forced to find alternative ways to explain individually what the learners have to do in the lesson.

Additional work puts more pressure on the teacher to assist not only those learners who are lagging behind but also the other group that needs to proceed with the lesson. The second factor T2 mentioned pertains to the inability of learners to sit still. According to T2, Grade R learners have a problem with regulating how they sit because "*they can't control their bodies*" (T2); thus, her response identifies weak self-regulatory skills.

According to T5, *"there's kind of a range. A big one that we see that comes out very quickly is the auditory processing; all the auditory difficulties."* Adding to this response is that "*each year, it seems to maybe get a little bit worse … uhm ... each year their listening skills, just my class in general this year, uhm ... just being able to follow instructions*" (T8); "*They can't process the actual information. And we do, we see it a lot now*" (T7). Other ranges include *"low concentration"* (T8) during lessons. Similarly, T4 said that she had –

> … poor [sic] concentrating children but [she] also think it's a sign of the times …. The children don't concentrate … but what I've also experienced is that sometimes some of the children don't concentrate, and you think they are not listening to you … [when in fact they do] because they are used to so much stimuli (T4).

Moreover, T4 stated that "*children struggle to do things for themselves."* The fact that parents or relatives do so much for children prevents them from doing certain things themselves. Ultimately, it would impede the child from being school-ready.

The participants went on to share that cognitive and behavioural challenges are often due to the following:

"*Behaviour that has been learned because at home; if you're emotional and cry, you get it,"* meaning that parents often give in to their children's demands because they

would like to stop their children's crying. According to T1, behavioural challenges are due to behavioural patterns learnt or accepted at home, and the same attitude is brought to school where learners try to get their way in class through emotional fits. Consequently, the methods adopted or accepted at home, can either assist learners to adapt effectively or to struggle within formal education.

T3, however, believes the following:

> … a lot of the times it's a problem with language they come, and they can't speak the language we are speaking in class, so they get very frustrated and the only thing they can do if someone is bothering them is to push them or to hit them (T3).

Consequently, if a learner is unable to communicate their needs or frustrations, this may result in learners finding other forms of communicating, and it may result in learners turning aggressive with their peers. Thus, learners need to have platforms where they can express and participate equally within the learning space.

For T4, cognitive challenges are the result of *"a lot of differentiation and concentration. You get the children who are obviously, the children that's older, except if they have a real ADHD problem; children that's older, they from the other half of the year, they concentrate longer"* (T4). Thus, T4 highlighted how cognitive challenges are the result of differences in ages. The older learners are, the more competent they may be to concentrate. Their cognitive frame is stronger and more mature to sustain its focus when learning.

T5, however, noted certain –

> … issues at home, personal issues, things that have happened in their lives, they have a difficult home life, or they are going through a divorce or a loss in the family some things like that, that obviously impact on their behaviour at school which impact their cognitive ability (T5).

Hence, the events in people's lives certainly affect how they later reason and respond within society and deal and process occurrences in their lives. Learners who are unable to process certain events in their lives struggle to flourish academically.

T6, however, was of the opinion that *"children are so visual these days with all the modern technology that they struggle to listen, focus and concentrate. A lot of the cognitive things come through that way – through focus and concentration"* (T6). Cognitive challenges are the result of external stimuli that hinder learners to listen and focus on what the teacher has to say. In as much as technology can be helpful for learning, it can also hinder other learning areas, such as the ability to focus or be cognitively flexible with tasks or engaging with certain items. Learners find themselves struggling to concentrate if technological devices are not used within the classroom.

Lastly, according to T8, one of the reasons for behavioural challenges is the result of learners' *"gross and fine motor; you can see they are not developed enough in those areas ... and we're seeing it more and more it also leads to them uhm ... not being able to be uhm ... cognitively developed"* (T8). T8 explained how weak gross or fine motor skills often affect learners' ability to regulate their bodies and work effectively in class. If learners struggle to sit still, for example, this can lead to their being distracted during activities in class. Ultimately, learners lose the ability to strengthen their cognitive skills. The above reasons reveal why teachers sometimes experience cognitive and behavioural challenges during class. These challenges may be the result of either internal or external triggers that influence how learners respond during a lesson.

The next question sought to explore how teachers developed executive function skills during lessons.

4.2.3.6   As a teacher, how do you exercise the teaching of self-regulation, working memory and cognitive flexibility in lessons?

While the previous questions explored the knowledge base of executive functions, this question aimed to find out how teachers implement the training of executive functions skills; this is the second anchor of my study.

With self-regulation, where learners must provide evidence that they can control their behaviour, the participants shared that they train this skill by providing an *"opportunity [for learners] to show how they can behave without [the teacher] telling them how they should behave"* (T1). T2 elaborated that she draws *"the children into*

the lesson, uhm ... making it interesting so that they are part of it. They can't all shout out at once, so it's self-control." According to T3, "*a lot of our time during the day, we just have to stop and say ok if you're ever in a situation, this is how you speak to a friend …. A lot of time, it's a lot of demonstration, role-play.*" T7, however, revealed that "*they are constantly doing activities that should encourage self-regulation; we give them coping mechanisms; praise them,*" and to do this, teachers need to –

> … teach them how to self-regulate … if this happens in this situation, how should you react, how should you not react …. We remind them as well because we do so much group work, they learn to work within that group; they have to regulate themselves and behaviours as well … (T6).

Learners at this point need to know "*what is right and what is wrong, and what we're allowed to do and what we are not allowed to do to others*" (T8). The responses provided by teachers explained that in developing self-regulation, learners work in collaboration with other learners. Learners are granted the opportunity to demonstrate the correct form to conduct themselves.

For the working memory (where learners mentally retain information), T1 stated that she trained this cognitive skill by constantly going through *"repetitions"* with her learners. Moreover, T2 engages in *"calling back, reminding [learners] what we did, or what will happen next. We do a lot of storytelling, story questioning."* T3, however, *"refer[s] back to what we've done, and kind of build on that,"* in other words, learners get the opportunity of adding information to what they already know. This would entail storing information in the form of a gradual process where learners "*work in the beginning of the year and throughout the year. As we go, we remind them before the beginning of the activities about how to do certain things*" (T6). T4, however, uses a more fun technique by developing her learners' working memory through music – the learners sing various songs that state the instructions learners must follow. Without the working memory, learners would struggle to follow instruction correctly, use the right tool or even complete their tasks. Thus, the working memory, in essence, plays a significant role in guiding learners to perform correct steps in a lesson.

With cognitive flexibility, however, the participants do *"a lot of different kinds of activity so uhm … we do writing, we do moving, we do sitting on the carpet activities, we do lying on our backs, we do a lot of art activities"* (T1). T6 said that she "*try and do as many different kinds of activities uhm ... visual, auditory, kinaesthetic to reach all the children but they learn to work in different manners as well; not just think in the one way that they are used to.*" Furthermore, T5 added that they do "*small group techniques to teach so when we uhm teach, we have four different stations and then in their groups, they visit each station and each station uhm ... will teach a similar concept but in a different way.*" According to T7, working in different learning areas "*gives them the flexibility to find a place where they can cognitively process everything.*" T3 and T4 related:

> … we have four levels: we have the lower level, the medium level we have
> the higher level, and then we have an extended extension for the children
> because … so your flexibility lies obviously in that - also in your instruction;
> change the wording of instruction (T4).

The responses provided reveal creativity and willingness of teachers to develop cognitive flexibility in various ways by teaching learners to adapt and work with various resources and learning opportunities; thus, their cognitive skills are constantly being stimulated.

The next question particularly explored the resources utilised to develop executive functions.

4.2.3.7   Do you use any materials to develop these mental skills? If so, please give examples.

The purpose of this question was to share lesson resources that develop executive functions. Furthermore, in obtaining this information, my hope was to share ideas with other teachers to help develop their lessons as well.

The resources used by participants include:

> You Tube videos, we're using sounds – listen to songs, uhm ... we go
> outside to write with chalk, uhm ... have the letters – I'm using letters as

an example of how we're learning, sand paper letters, uhm ... and then we practise, like we have worksheets with just the letter (T1).

T1's response indicates how teachers make use of technological devices to enhance the concept of a lesson. Moreover, the teacher reinforces what the class has learnt through activities.

- T2 uses *"a lot of uhm ... tactile activities that they … we're trying to avoid as much bookwork at this stage, so they can actually use everything through their senses."* Tactile activities would enhance cognitive flexibility as learners often practise to use their cognitive abilities.
- For T3, it includes *"counters, big pictures letter, and characters story."* These form part of demonstrations that enhance visual learning.
- T4, however, utilises *"routine chart or timetables; behaviour charts, your school routine charts, my school rules chart, and rewards charts."* These resources aid teachers to regulate learners' behaviours, their working activities and also rewards good behaviour at school.
- T5 uses *"De Bono's thinking hats, Kagan strategies, the philosophy for children, games; we have little cards and things."* Thus, T5 applies various resources that are not only fun, they also stimulate learning at the same time. Furthermore, T5 utilises age-appropriate materials that intrigue the learners.
- T7 mentions the use of *"Kagan quiz."* This activity entails the asking and answering of questions. The cooperative learning method enables learners to revise what they have learnt with their peers. Some of the advantages of being paired include developing confidence, lesson involvement and discussions with fellow peers.
- The use of *"play stations"* (T8) in the classroom. Most of the participants made use of this technique to enhance cognitive flexibility in learners. The different stations entailed different activities that centred on the same learning concept. This technique encourages learners to apply different methods and alternate between solutions.

From the responses provided, it was clear that participants utilised diverse materials to enhance cognitive flexibility, self-regulation and working memory in Grade R.

Teachers use a combination of self-made resources, natural materials, recycled items and fun games that enhance lesson concepts.

4.2.3.8 Do you think a school with fewer resources (poorer context) would hinder your ability to implement the training of these mental skills? Please justify.

This question aimed to explore if the learning context affected their form of implementing executive functions. Thus, T1 mentioned:

> I think there are two ways to look at it. I think if I was a teacher who had experienced a way of teaching like this and having been exposed to the learning materials that I can use … uhm …. I think it would be completely different if I had to work in a poorer environment when I've started here [richer school].

T1's response revealed how different learning environments can have an impact on the ability to teach, especially if the context is different from what they may be used to. Furthermore, T1's response correlates with that of T8 where T8 mentioned that "*it would definitely make it more difficult; I'm not saying that you couldn't do it, but it would definitely make it more challenging.*" Although challenges may exist, they do not make it impossible to develop executive functions.

Consequently, all of the participants agreed that *"it's very much up to the teacher and what she puts into it; bring it into ideas they know"* (T2). T3, for example, shared that because she "*taught at all these schools, all the types of schools; you have to be very creative; make toys from scrap material*s."

> If [teachers] have access to some sort of internet, then they could go and develop themselves. So, if you're in a school like that [under-resourced], it doesn't mean that you must not do anything because there are no resources; you could develop yourself …. If you have a teacher who's passionate and wants to build herself, she can do it; you can ask for the community to help you with … objects and scrap things and old boxes and things to make things so [ultimately] you could (T6).

Taken together, the participants believed that when it comes to developing mental skills, the opportunities are endless.

4.2.3.9 Does your school environment play a role in implementing self-regulation, working memory and cognitive flexibility? How so?

The purpose of this question was to explore how the participating schools enhanced the development of executive functions. This question also sought to demonstrate more ways by which other schools can incorporate the training of executive functions in their daily routines. Hence, S1T1 revealed that there are "*many assistances for the number of children and ratio; [furthermore] the way we teach [using] different senses, the child is stimulated in different ways.*" Also, S3T3 shared that the "*ethics of the school is quite strong and they like filter through how our children act uhm … especially the Catholicism that they do.*" Hence, the ethos of the school correlates with developing executive functions at school. It is especially important that learners "*know what rules are in place – that makes a big difference … they then know there's consistency*" (S2T2) in establishing school rules. According to S2T2, school rules do not only guide learners' behaviour but also implement a uniform structure for teachers to collaborate with regard to developing their teaching skills. S4T5 mentioned:

> … in our school, we all follow the same sort of structures. We all go to the same training. If we don't all get to go, we share with the others; we have workshops where we share with each other what we are doing. We have opportunities to visit each other's classes to learn from each other.

This response of S4T5 correlates with that of S2T2 in that they both highlight the importance of being consistent. The same rules reinstate and remind learners of how they ought to behave in the schooling environment.

Consequently, all the participating schools have a unique form of developing executive functions in their school. Because each school has a unique ethos, the rules found therein are dependent on their beliefs. All of the participating schools, however, shared common values, which included respecting one another, being kind to peers and teachers and refraining from hurting others – these are a few of the examples that guide learners' self-regulation at school.

4.2.3.10 In your opinion, do you feel you have received adequate training to develop mental skills in Grade R learners? Elaborate on your answer.

I asked the participants this question because the study revealed existing challenges that hinder the development of executive functions; hence, I wanted to find out if perhaps the training of teachers had anything to do with the inability to develop executive functions. Half of the participants stated that experience was their biggest teacher. T4 for example, said:

> … if you're a teacher, it's not about your training …. I don't think any training can actually prepare you for what you're going to get; I grew as a teacher so then only my experience, I tell you, prepared me more.

Even though experience plays a major role in developing mental skills in learners, the participants shared that there are always rooms for improvement. They went on to encourage other teachers to attend more training sessions and seek knowledge for their betterment. T5 stated:

> … we've had that a lot of training over the last couple of years specifically, a lot of the [21]st century skills are coming forward, so we are learning to teach them in a manner different to the way we used to.

T6 furthermore revealed:

> … we've been given the opportunity, but I mean there's so much you can do on your own. We often do webinars on our own, where you just find things online uhm … read articles and things like that.

At their school –

> … when we prep, and we plan and for a week's worth of work, we discuss it; we work as a group, we collaborate together, we discuss how we can uhm ... implement the skill, or who did what and we reflect as well (T8).

Hence, according to teachers, the training of mental skills occurs in teachers collaborating to share knowledge and resources among one another. This is a very valuable method considering that teachers often face the same challenges; hence, the comradery of sharing ideas is an advantage to teaching techniques.

4.2.3.11 What do you think parents can do to help develop these mental skills?

What is especially interesting in the responses obtained is that during the interview, even before asking teachers what parents could do to help develop self-regulation, working memory and cognitive flexibility, a few of the participants revealed how the lack of knowledge or awareness parents had of school readiness affected the way they prepared their children for school. T1, for example, stated:

> … between the way that we expect the children to behave and the way that the parents bring the children up, there's sort of like a little gap because … it's frustrating that in the classroom, not only for me but for the friends and for him …. There are certain things they need to learn that can cause barriers.

There is a gap between how parents prepare their children for school and what teachers know about school readiness. This shows there is a communication gap between parents and teachers. According to T3, this is because *"a lot of parents don't know where to start from."* T2 revealed that "*parents don't actually know how to implement it and the TV is much easier to let them play uhm ... and calm them down but they're not actually learning …. They don't always realise that grade nought is an early vital learning year."* Consequently, parents do not have sufficient skills or knowledge to develop executive functions at home or outside the school. Ultimately, there is a need for parents to know about executive functions so that parents can implement the training of these skills prior to their children commencing with formal learning.

Another frustration was expressed by T4:

> … parents think that teachers are supposed to teach concentration and concentration is something that's been taught from baby and on …. We have beautiful grannies and beautiful mommies but … because they do everything for their children, so they don't know better, they don't encourage independence and a child that's independent has a process in his mind.

T4's response highlighted a learning or development problem because children are being enabled by their families; this then impedes their ability to explore and learn things for themselves. This problem equates to school readiness challenges.

In gaining such useful rich knowledge, the responses from the participants added vital knowledge to the current question. The last question of the interview aimed to assist parents with developing executive functions, particularly outside of the schooling environment. Hence, T1 advised that *"parents shouldn't try to be able to be everything; [instead] interact with your child."* Moreover, T1 highlighted how important interaction is in order to develop mental skills. T1's response correlates with that of T3, where interaction is also mentioned as an important factor that parents can make use of. T5 provides fun simple suggestions on how children-parent interaction can occur; according to her, parents can *"be more involved (laughs) and just do more like … actually old fashion stuff. Building puzzles, playing proper games."*

From another point of view, T4 suggested more communication between parents and children: "*talk to your children about everything. What they experience what they're doing, you know, that will stimulate their brains more."* This response is similar to that of T6, who stated that parents need to *"be interested in what they are doing … [and] speak to them about their day."* T2, however, expressed that one of the forms by which mental skills can be developed is through reading; this implies added time that parents need to engage in their children's learning. T7 also stated that young children can be introduced to household chores at an early age, and in doing so, they are aided to be responsible and look after themselves. T8 advised, "*showing them how to eat your dinner properly and how to have table manners, they are going to learn it because you are teaching them constantly;"* this demonstrates a different form by which parents can interact or involve themselves with their children.

In conclusion, the interviews provided valuable knowledge and insights from the participants based on their daily experiences. More interesting were the added explanations on when, how and why children have cognitive and behavioural challenges. Most insightful were the various ways in which teachers inculcated

developing executive functions in their lessons. Especially in creating learning resources, the teachers made use of resources readily available in their context.

4.2.4   Lesson observation data

Apart from conducting interviews with the participants, I also observed a lesson by each teacher. Corbin and Strauss (2015:41) state that "the reasons why observations are so important is that it is not unusual for persons to say something but in reality, they are doing something else." Hence, for my study, I observed a lesson of every participant to ensure that what the participants had stated during the interviews, were in fact done and implemented in their lessons. My other reason for observing the participants was to see their teaching techniques, what resources were available in their classrooms and how the learners responded to the training of executive functions during lessons.

Consent forms were obtained from the school authorities and the learners' parents; this was to have permission to observe the learners while their teacher taught. The learners, in this case, were indirect participants because the main aim was to see how the teachers interacted with the learners and instilled training of executive functions.

Field notes were woven into the observation data; this was to support my reflection on the participants' unique meanings and note their implementation of the skill in their lessons. All the observations were scheduled after the interviews had occurred on a date that would be most suitable for the teachers. For my study, the participants were observed for a period of three hours. During the observation process, I utilised a checklist to guide the process by which I would obtain the required information that correlates with the interview responses. Consequently, this revealed how Grade R teachers develop executive functions in lessons.

The teachers had separate observation checklists than those of the learners (see Appendices B and C). I developed both checklists to identify the following factors:

- The learners' behaviour during the lessons
- Challenges of developing executive functions
- Measures that support the development of executive functions

The observation checklist of the teachers is provided, followed by the checklist of the observed Grade R learners. These tables outline the observations I noted down during the lessons.

4.2.4.1 Observation of teachers

Table 4.3: **Observation of teachers**

Teacher observation schedule	Responses found
1. Which of the executive constituents are evident in the lesson?	All executive function skills were evident in all the lessons presented by teachers, from self-regulation to working memory and even cognitive flexibility; all executive skill functions were implemented in lessons.
2. What teaching method/action does the teacher utilise to develop executive functions?	TO1, for example, made use of storytelling, which prompted the learners to pay attention and develop their working memory as the teacher asked a few questions for the learners to discuss. TO7, however, made use of physical activities. She incorporated maths activities with physical exercises, such as jumping, clapping hands and spinning around a number of times. The learners seemed to be very willing and were having a lot of fun. TO4 similarly did the physical activities TO7 had done; however, she applied kinaesthetic learning in her lesson. As teachers know how Grade R learners can be very hyperactive, the teachers applied methods that interested the learners.
3. What tool does the teacher use to develop executive functions?	According to the observations conducted with all the participants, most of the resources that were used were created by the teachers themselves. Furthermore, the learners had various toys and games to stimulate the learning of concepts (TO2, TO1). Some of the items included stationery, such as papers and coloured pencils (TO5), while others used natural/recycled objects to design concepts (TO4, TO6). What is interesting is that at all the schools, the teachers hardly used technological devices with the learners; the resources they used were often self-made. By doing so, the teachers are striving to develop learners' cognitive development the most natural way possible. For working memory, all of the classrooms had routine charts, timetables and reminders entailing information learners needed to know. For self-regulation, classroom rules and pictures were visibly displayed around the walls, and the classrooms had behaviour charts that rewarded the learners for either good or bad conduct (TO3, TO1). Furthermore, all of the schools were richly resourced with various tools that promote the learning of a lesson.
4. How does the lesson support the development of executive functions?	With TO1, at the end of the lesson, the learners had to pick up after themselves, for example, fixing their own chairs. TO3 demonstrated the way learners had to play on the seesaw; how they could sit properly and not run or push one another. This observation relates to the answer that T5 provided, in that learners need to be shown how to behave appropriately or regulate themselves.

Teacher observation schedule	Responses found
	With TO5, however, the learners had to sit still in a circle as the teacher told a story; they were then assigned to go and work in a learning station consisting of groups. T5 also had a technique of doing a brief body routine to get the learners together, arranged or composed. In knowing that Grade R learners need a lot of body stimulation, this worked well in getting the learners in order. Hence, the observation of TO5 correlates with the response that was provided by T5, which let me know that the teachers implemented the methods they had mentioned during the interview. With TO4, the teacher made use of routines that demonstrated the sequences to guide learners' behavioural patterns. This still assists to regulate learners' behaviours without the teacher constantly telling learners what to do. Furthermore, routine charts allow learners to remember the steps they need to take to complete a task. TO8's form of developing the working memory was through exercising the repetition of the numbers the learners were told. The teacher began by repeating a long number sentence; she then paused, and the learners had to repeat it to her in the same order; example: three double eight one six five ... The learner had to state the same order. This type of exercise promotes self-regulation to listen, working memory to remember and cognitive flexibility to repeat numbers instead of having them written. With TO1, the teacher recalled an activity that had been done previously – recapping information. This correlates with many of the responses the teachers gave in their interviews that mention how working memory is developed. Interestingly, TO2 had learners working using their senses (touch, smell, hear) to identify what was in a concealed bag. Through this form, the learners were encouraged to depend on their various senses and promote cognitive flexibility. In TO5's lesson, the learners had to count while they clapped their hands; the aim with this kinaesthetic methodology is to implement body movements so that the learners' attention span is sustained and they can participate during the lesson. The method used by T5 is similar to that of T6, who also made learners count the number of body parts they had on the right side of their body, compared to those on the left. The ultimate aim was to understand symmetrical imagery. This stimulates learners to become more aware of their bodies while improving their maths skills (TO6). TO8: learners had to identify words (demonstrated through pictures) that sounded the same and words that rhymed. Thus, each picture showed how words were written, and from these the learners had to select the pair that sounded the same.

Teacher observation schedule	Responses found
5. What challenges (cognitive/behavioural) do the teacher face while developing executive functions?	During the lesson of TO8, a learner got emotional about the fact that she was being teased for doing something she claimed she had not done; it then led her to raise her voice and eventually cry. This note confirms the response provided by T1 with regard to learners acting emotional to get what they want in class. With TO2, however, the learners constantly interrupted the teacher during the lesson as the teacher tried to explain the lesson concept. Furthermore, the teacher had to call the learners' attention various times to settle them down. Some of the learners also had challenges with sitting still. This observation correlates with the response that T2 provided. TO3: the learners were excited to answer some of the questions posed and this resulted in a few learners shouting out the answers. Other noted challenges included learners easily getting distracted from their work by looking at what their peers were doing (TO7), and learners interacting during the lesson (T6) and sometimes refusing to follow the teacher's command (TO5) to act in accordance with the rest of the learning group.
6. Does the teacher guide learners to get organised for the lesson?	All of the teachers made sure the learners' attention were focused on her so that she could inform them about the instructions. Because Grade R learners are very active, most of the teachers waited for the learners to settle down before they commenced with the instruction. Pertaining to TO6, when learners failed to sit down, the teacher called the learners back to the carpet to get reorganised. The learners were reminded what it means to behave properly prior to commencing with a lesson. This technique was mentioned by T7.
7. How does the environment impact on the development of executive functions?	With S1TO1, the number of learners in a class is less than 20. This provides the opportunity for teachers to attend to learners who are struggling. Furthermore, the learners also have computer lessons, and the classroom has posters that demonstrate how to behave, among others. In S2TO2, the lessons occur in the form of a routine and the school has sports as extra activities. Furthermore, the classrooms have organised learning spaces; this is to instil order and control over learners and their work. With S3TO3, however, the learners are allowed to play games and incorporate various natural tools in lessons. Moreover, their seating arrangements place learners according to their mental capabilities, and the classroom is spacious enough to do various fun activities. In S3TO4, the learners are often given the chance to clean up after themselves. Rules are used in the classrooms to guide the learners' conduct/behaviour, and the schooling environment provides different levels of curriculum differentiation; this is to assist the learners in attaining the learning goals in accordance with their cognitive strengths and to support inclusivity among different learners.

Teacher observation schedule	Responses found
	Lastly, with S4TO6, the school implements various activities to learn a single concept. The lessons, for example, usually comprise different stations; hence, learners spend about 10 minutes doing a specific task before rotating to proceed with the next task. At these working stations, the cognitive flexibility of the learners is enhanced because the activity calls their minds to work differently each time.

4.2.4.2 Observation of learners

Table 4.4: **Observation of learners**

Learner observation schedule	Always	Sometimes	Never	Comments/Findings
Do the learners follow the teacher's instructions easily?		X		Most of the learners in all of the classrooms struggled to follow instructions that were given, especially regarding self-regulation. These included keeping quiet, calming down, or sitting still.
Do some of the learners go back to the teacher because of uncertainties with regard to the classwork?		X	X	In LO2, LO4, LO5 and LO6, some of the learners returned to ask the teacher to verify what they had to do in the lesson; this was done for learners to assure themselves how to follow the correct steps and avoid making mistakes during the activity. Groups LO1, LO3, LO7 and LO8, however, never experienced uncertainties during the lesson. When the instructions were given, the learners easily obeyed them. Hence, the findings here indicate that for learners to go back to the teacher for uncertainties depends on the activity, as well as their level of comprehension of the task.
Are the learners organised prior to commencing with the lesson?	X			In all of the lessons, the teachers made sure the learners had only what they needed for the lesson. This was done to ensure that the learners would not get distracted by materials they did not need. The teachers worked to ensure the learners were always organised before commencing their tasks.
Do any of the learners show indecisive behaviour during the lesson?		X		The observations noted that whenever learners felt unsure of themselves or the activity, they waited a while to look what their peers were doing and get an idea of the steps they should take themselves (LO6, LO3).

Learner observation schedule	Always	Sometimes	Never	Comments/Findings
Does the teacher repeatedly call the attention of any learner?		X		The teachers would call the attention of specific learners who misbehaved or became too rowdy (LO8, LO2). This indicates that some of the learners still needed to be guided to regain focus; their self-regulatory skills/attention span were weak.
Do all learners finish their work on time?		X		The learners in groups LO3, LO6 and LO7 all managed to finish their work on time. However, the other groups (LO1, LO2, LO4, LO8) had a few learners who did not finish their work on time. This indicates that some of the learners struggle to work at their expected pace and manage their time effectively.
Do learners work alone during the lesson?	X			Although most of the learners sat according to arranged groups, most of their work entailed completing tasks on their own unless the teacher instructed otherwise; however, this did not occur.
Is any learner easily distracted from his/her work?		X		Most of the learners did get distracted on a couple of occasions; this included fidgeting with their bodies or other items and often zoning out. LO8, for example, had a learner playing with her friend. One learner in LO3 had ADHD; hence, she constantly lost focus or engaged in different activities. This information speaks of some of the challenges that teachers experience and must still overcome during lessons. T3, for example, had to work closely with a learner who suffered from ADHD through maintaining contact and control over the learner's actions.
Do any of the learners interact with peers during the lesson?		X		During my lesson observation of learners, I noted that most of the learners in all of the classrooms often spoke to their peers/friends during the lesson; this was the case except for LO1. As the teacher had the sternest approach compared to the other Grade R teachers, T1 made sure that her orders were obeyed. Hence, her learners avoided speaking to one another during the lesson. Another reason could also relate to an emotion attached towards the teacher. In LO3, for example, the learners respected and feared their teacher, this thus made them complete the activity without talking to their friends. In other lessons, however (LO2, LO5), although the learners loved and respected their teachers, they did not keep quiet.

Learner observation schedule	Always	Sometimes	Never	Comments/Findings
Is there any learner who helps other learners when another learner is struggling?			X	None of the learners assisted their peers during the lesson except for group LO8. A learner from the group went to show a fellow learner how the activity had to be done. This indicates loss of self-regulation as the learner went to attend to someone else's work.
Which skills pertaining to executive functions do learners struggle with the most?	N/A	N/A	N/A	Self-regulation proved to be the hardest executive skill for the teachers to maintain in learners. T2 and T5, for example, greatly struggled to have their learners pay attention and focus on the lesson that was being presented. Other problems, such sitting still or keeping quiet, were also present in other classrooms (T6, T7). This informs me that various strategies still need to be instilled to develop/enhance this skill.

According to the observations noted, all of the participants were aware of the important role cognitive and behavioural skills play. Both the teachers and the learning environment worked together towards developing executive functions, and this was done within the daily school routine. From my observations, it was also evident that it is the teacher's main responsibility to support the implementation of executive functions by learners during the lessons; hence, the learners critically depend on their teacher to guide them in attaining their lesson objectives. Although it was evident that the learners struggle with self-regulation, their working memory and cognitive flexibility showed strength. The teachers, for example, reinforced the learners' working memory by guiding the process of an activity; this was done to assist the learners to work independently. Regarding cognitive flexibility, however, the teachers made extra efforts to form creative platforms to develop it. Consequently, the study can confirm that all the executive function skills are being implemented in lessons. It is important that learners attain these skills as they help learners to adapt socially and excel academically.

In the next section of the study, I will interpret the interviews and observation data according to themes and categories found.

4.3   DATA INTERPRETATION ACCORDING TO THEMES AND CATEGORIES

Bogdan (2003:147) states that "data interpretation refers to developing ideas about your findings and relating them to the literature." Furthermore, Madjitey (2014) adds that the essence of interpreting information is to cultivate meaning and significance of the data. In analysing all the interviews, I developed clusters of information based on words, sentences and examples the participants shared. The clusters of data were then grouped to form my research themes.

Hence, in the following section, I will discuss all the themes that emerged: the perceptions of executive functions, challenges in implementing executive functions, and the measures that support executive functions. Furthermore, the themes have categories; thus, Table 4.3 indicates all the themes and categories that interpret my data.

Table 4.5:   Themes and categories of the study

Themes	Categories
Theme 1: *Teachers' perceptions of executive functions*	• Mental skills • Self-regulation • Working memory • Cognitive flexibility
Theme 2: *Challenges*	• Cognitive challenges • Behavioural challenges • Poor learning context
Theme 3: *Measures with which to support executive functions*	• Mediated learning • Resources • Adequate training of educators • Schooling environment • Parental involvement

4.3.1   Teachers' perception of executive functions

The first theme centred on exploring what executive functions are, according to Grade R teachers. Perception, in this case, refers to views, experiences, beliefs and interpretations of a phenomenon. Thus, the first theme explored the views, experiences and beliefs of executive functions. In doing so, four categories emerged, namely mental skills, self-regulation, working memory and cognitive flexibility. As the teachers were not very familiar with the term "executive functions," I resorted to simplifying the term for them to understand what the concept is and contribute knowledge to it. In the following section, I will discuss the interpretation of all four categories.

4.3.1.1   Mental skills

Mental skills stood out as one of the categories that embody executive functions; this is because mental skills encapsulate the basis for learning. The data findings, in general, revealed that the participants defined mental skills as "*everything that goes on in your mind; the way that they process things."* The literature corroborates this statement by mentioning that executive functions involve the manner in which people construct meaning from learning, which includes paying attention, focusing, recalling and preparing the steps to attain our goals (Harvard University, 2011:5).

Thus, mental skills comprise cognitive practices that organise and construct the mental schemes people learn (see Sections 2.2. and 2.4.3).

According to the participants, one of the reasons why mental skills are necessary for learning is that without such skills, learners would be unable to learn – they would not be able to process anything. Subsequently, if a learner battles to process cognitive schemes, this affects all the other areas of his or her life (see Section 2.4.2). What the participants believe about mental skills verifies what the literature interprets as required to help people to learn. Mental skills work as building blocks that enable people to cognitively and socially operate in and adapt to different environments (Harvard University, 2011:3). Learners, in this case, would be able to complete their learning tasks if they regulate themselves based on organising and planning their work (see Section 2.2.2.2).

Furthermore, the fact that mental skills are applied in people's day-to-day living demonstrates that mental skills are also life skills. Harvard University (2011:3) reveals that mental skills entail various skills or capabilities that permit people to perform everyday tasks. Not only do they assist learners in the classrooms, but mental skills are also considered to be positive adaptive skills that facilitate handling challenges successfully. Mental skills not only assist learners in classrooms but are also adaptive and positive skills that permit learners to handle the pressures and challenges of life successfully. The participants stressed that without mental skills, a learner would be susceptible to struggling in both the learning and social context. Hence, mental skills not only assist the learner but also serve the society at large because they allow people to work cohesively with one another (see Sections 2.2 and 2.4.2).

Consequently, by integrating the literature and the participants' responses, the study found that teachers have sufficient knowledge of what executive functions entail and how these assist the learning process. Both the literature and the empirical study reveal that mental skills are fundamental learning skills as they are basic cognitive tools that permit learners to process information and enable them to respond positively in the learning environment (see Section 2.2.2.2).

4.3.1.2 Self-regulation

As the second component of executive functions, self-regulation helps learners control their behaviour and their attention to achieve a task. Harvard University (2011:2) deems self-regulation as the gateway that filters distraction, temptations and unnecessary information. Furthermore, it allows people to consider their actions before playing them out. In accordance with this explanation, in the empirical data it was found that the participants described self-regulation as the ability to manage one's actions in accordance to the environment. Its characteristics include being responsible, having control over actions and properties and behaving appropriately in class. For this to occur, learners would need to have physical control over their bodies, such as sitting still or having to keep quiet when the teacher is talking (see Section 2.4.1). Without this skill, many learners would struggle to cope in class in that their behaviour would not allow them to learn effectively. Furthermore, they would be a distraction for their peers and make teaching difficult for their teacher. This is why the literature emphasises the need for learners to have self-regulatory skills already upon commencing with formal learning (see Section 2.2.1.2).

Attesting to this matter, the literature clearly reveals how many Grade 1 learners who commence formal education with weak self-regulatory skills; these include having a short attention span, being hyperactive and displaying impulsive behaviour in and around school. The literature reveals that more learners are failing to pass Grade 1 (see Section 1.5). In combating this lack of self-control, the empirical data noted the efforts of Grade R teachers and their schools to develop self-regulation (see Section 4.2.3.6). However, many learners still require assistance as the teachers themselves deal with various challenges in the classroom.

Self-regulation is a crucial element needed for learning and schooling adjustment. This is because it enables learners to master control over their learning and behaviour. According to Singer and Bashir (1999:266), this behavioural skill aims to ensure that learners commence school with the necessary capabilities, so they can settle in more comfortably in a formal class setting. Particularly when teachers give instructions or conduct a lesson, learners need to have composure, which refrains them from disrupting the lesson or their peers. Thus, learners need to have basic

behavioural skills that enable them to obey school rules (see Section 2.4.5). The ability to have control is beneficial not only to the learner but also to their learning.

Relating to self-regulation, according to Vygotsky's theory, the Zone of Proximal Development shows and guides learners how to behave appropriately. This, however, is done in accordance with the culture and beliefs of the environment (see Section 2.6.2). Furthermore, self-regulation facilitates learners with learning adjustment because it informs them what is expected of them (see Section 2.4). Both classroom and school rules determine how children ought to engage with one another and how they should behave in class. Vygotsky (1986) for example, explained how teachers could model behaviour or steps to reach the learning goal. According to him, this method is used because learners would not be able to master the skill without the necessary guidance or help from adults. Hence, for learners to attain self-regulatory skills, it is important that both parents and teachers model appropriate behaviour for formal learning (see Section 2.6.1).

4.3.1.3 Working memory

The third category discussed teachers' understanding of the working memory. The findings revealed that teachers believe the working memory is a banking system. This banking system not only stores vital information but also allows a person to construct new knowledge with it (see Sections 2.2.1.1 and 2.3.1.1). The purpose of the working memory, according to the participants, is to guide a person in following the required steps to attain a goal and to make sense of new information. Furthermore, the information in the working memory hardly remains inactive; in fact, the word "working," indicates that the mind is always put to use in everyday learning and activities. The literature confirms this point of view in that it states that the working memory handles all the short-term operations people perform (see Section 2.3.1.2).

Secondly, the working memory pertains to following sequences of operations. This can be through patterns or steps a teacher takes to assist learners with retrieving knowledge (see Section 2.3.1.1). Because sequences carry out patterns, this makes it easier for learners to retrieve knowledge towards reaching an end goal. The findings furthermore indicate that a problem at schools today relates to learners struggling with following basic instructions; this is seen in learners failing to retain or

listen to or process information the teacher utters during class (see Section 2.4). Retaining information can be hindered by various factors, such as having a limited attention span or the presence of emotional stressors. An example provided by the literature discusses how a poor environment, for example, can inhibit the working memory from developing effectively; thus, it is important that teachers minimise environmental stressors as much as they can (see Section 2.5). The participants confirmed the various factors that cause learners to lose focus during class; it was one of the reasons for addressing cognitive challenges during lessons in the study.

Relating the above to Vygotsky's theory, because teachers are the agents that direct lessons, the working memory is the tool that would guide learners to complete a task. The literature attests to this comparison when it mentions that the working memory guides learners to participate in school-related activities; these examples include performing during plays, reciting poems, reminding learners of their roles during group work and assisting them to either take a break or resume with a task (Harvard University, 2011:2). According to the answers obtained from the participating Grade R teachers, they are aware of the vital role they play in assisting with the development of learners' working memories. Furthermore, the teachers revealed that their practices include rehearsing and often reminding learners what they ought to do to achieve the learning outcomes (see Sections 2.6.1 and 2.6.2).

4.3.1.4   Cognitive flexibility

The last category that relates to executive functions pertains to cognitive flexibility. Most of the participants shared that cognitive flexibility refers to learners being able to adjust to a new environment. Added criteria are adaptation, rethinking and different working levels. Cognitive flexibility entails learners thinking differently to problem-solve or apply creativity in certain activities. Often learners will find themselves working in a new environment or with different tools; hence, learners require the skill to adapt to and function with either (see Section 2.2.1.3). The participants explained how vital it is to adapt to a new situation and to rethink and work at different levels.

According to Vygotsky's theory, cognitive flexibility is categorised under psychological tools – higher thinking skills. The higher mental skills are combined with lower mental skills to solve problems (see Section 2.6.1). This view is parallel

to the participants' outlook that cognitive flexibility implies that a learner is able to think in different levels. According to the participants, cognitive flexibility pertains to changing a thinking pattern, developing alternative solutions or inventing creative ideas.

Cognitive flexibility is essential in enabling a learner to re-strategise and solve a problem alternatively; this then permits the learner to progress and complete a task. Consequently, the participants recommended the best way to develop this skill is by enabling various working activities (see Section 2.2.1.3).

4.3.2   Challenges

The second theme pertains to the challenges in developing executive functions. These challenges shed light on factors that impede the implementation and development of executive functions. Some of these challenges are the result of internal and external matters found in learners and their environment and have been identified as cognitive and behavioural challenges, as well as poor learning contexts.

4.3.2.1   Cognitive challenges

These challenges relate to mental processes that impede the operation of executive functions. The participants in the study identified factors such as learner distractedness, information processing, auditory processing and language barriers as some of the factors that impede the functioning of executive functions during teaching (see Sections 2.3.1 and 2.4.2).

Various participants expressed how Grade R learners are distracted easily. This can occur during lessons, when learners zone out or when the teachers need to call for learners' attention repeatedly (see Section 2.3.1.1). T7, for example, noted that cognitive challenges are the result of learners not engaging as much as they should with adults. Furthermore, the frequent use of gadgets leave learners feeling bored easily if they do not use them; this calls for teachers to sustain learners' attention during their classwork activities. The participants revealed that many learners battle to concentrate during lessons and, after a certain time, learners are even prone to lose interest if the lesson runs for too long. Similarly, the literature confirms this stance when reporting that the inability to adjust to or function at school is often the

result of inattention, commonly rooted in cognitive and behavioural weaknesses (see Sections 1.5 and 2.4.3).

The second cognitive challenge identified, relates to information processing. According to the participants, learners struggle to process information they are told during lessons. Due to learners sometimes having weak attention spans, limited memory storage and difficulty accessing what they have learnt during the lesson, this results in learners often misinterpreting information, and thus affecting their performance in class (see Section 2.2.1.1).

Thirdly, the participants often mentioned that learners struggle with both focusing in class and listening to what the teacher has to say. They have difficulty listening during the lessons or when instructions are being given. The inability to listen or process verbal information accurately impedes learners' ability to perform the lesson tasks well, and as a result, they miss valuable information (see Section 2.2.1.2). Hence, when the participants refer to Grade R learners struggling to listen, it implies that these learners have not fully mastered the skill to focus on what they are being told in the classroom. The failure to listen attentively ultimately affects the learners' performance and academic success (see Sections 2.2.2.2 and 2.4.5).

Two of the participants revealed that language barriers sometimes have an effect on both the teacher and the learners (see Section 2.4.4). To illustrate, T1 remarked that because language poses to be a more challenging subject, it takes longer for learners to grasp certain skills, compared to a mathematics lesson. T2 and T3, however, believed that language poses to be problem when learners cannot express themselves. This is because it impedes their ability to socialise with other peers and develop effective communication skills (see Section 2.4.4). According to the literature, learners need to have the ability to communicate upon commencing with school; this would enable them to socialise and communicate their needs in the classroom (see Section 2.4.4). Without the ability to communicate, the learner would struggle to engage with the rest of their class.

Since learners are exposed to different stimuli in their environment, this can cause them to get distracted during lessons. The literature notes that because learners are at a stage of observing one aspect at a time (see Section 2.3.1.1), the moment that

something different is presented, children's attention is shifted to the new item. On the other hand, the literature also affirms that learners should be able to control their attention and be less distracted (see Section 2.4.3). Consequently, in aligning the literature with the responses of the participants, it can be deduced that Grade R learners' cognitive skills are not well established for formal learning.

4.3.2.2 Behavioural challenges

Throughout the study, one of the challenges that were identified includes learners' inability to regulate their emotions. The literature reveals that one of the reasons for this is that learners are still developing their emotional control at this stage (see Section 2.4.2). Subsequently, when learners struggle to process their frustrations, this causes them to express these emotions by either crying or becoming aggressive. Other emotions, such as their experience of the lesson, are expressed by either boredom or excitement in an activity. Hence, teachers can assist the development of social and emotional skills by supporting and guiding learners' skills to regulate their emotional responses (see Section 2.6.1). Furthermore, teachers can accommodate learners' interest within the lessons so that every learner can become involved.

Being in Grade R, many learners are at a phase where they are developing control over their actions and gradually learning to self-regulate (see Section 2.4.1). The findings revealed that many learners were noted to be battling to sit still or they were fidgeting with bodies during lessons. The inability to have physical control is sometimes caused by a weak attention span; thus, when learners get bored, they do something else that interests them, such as play with objects or fidget with their bodies.

Vygotsky (1986) noted this problem under the Zone of Proximal Development when he stated that both cognitive and affective factors have an impact on learners' participation in a task. With regard to the affective perspective, this relates to feelings that interfere with learners successfully completing a task. According to Vygotsky, such feelings include boredom, confusion or frustration that a child may experience during a task. These factors impede learners from completing their work. With regard to the cognitive perspective, the cognitive perspective relates to how the task should neither be too difficult nor too simple, otherwise the learner loses the drive

to complete a task, or he or she may even complete the work without having learnt anything. Shabani et al. (2010:241), affirm that both boredom and confusion could enhance distraction in learners. Subsequently, because the learner struggles to remain attentive and regulate his or her behaviour, the teacher often has to steer learners back to finish their work. Thus, the teacher needs to bear in mind how to plan and develop a lesson in a way that should prevent learners from attaining the outcomes too easily or losing the motivation to complete the exercise (see Sections 2.4.2 and 2.4.3).

The second behavioural challenge noted both during the interviews and the observations was that the Grade R learners often lacked the ability to follow instructions given by their teachers. Some examples of this include sitting still or having to keep quiet. The inability to follow instructions ultimately affects learners' behaviour in having to behave appropriately and often disrupts the order of the classroom (see Section 2.4).

From the responses obtained, the participants were aware of how different factors generate cognitive and behavioural challenges in Grade R learners. They further explained that cognitive and behavioural challenges are often the result of internal or external influences (see Section 4.2.3.5). Although the literature notes how learning develop certain skills, it also informs us that Grade R learners should already know what it means to follow rules at their age – this will facilitate their adjustment to school and assist with their interactions with others (see Section 2.4.5). Without this ability, learners will constantly find themselves in trouble where they will battle to complete their work or clash with their teacher and their peers (see Section 2.4).

4.3.2.3 Poor learning context

The last identified challenge with regard to developing executive functions involve a poor environment. As South Africa is known to have many poor communities, many of these poor learners are found within South African classrooms. The literature reports that learners who come from deprived households have poorer vocabularies and executive functioning skills. One of the reasons for this is the lack of learning opportunities that would expand and strengthen the acquisition of learning certain skills (see Section 2.5). Furthermore, poor environments are vulnerable to abuse,

violence, crime and stress. These factors, according to the literature, strain the development of executive functions. In a poor learning environment, there are fewer opportunities available to enhance executive functions in the form of reading books, playing educational games and being physically active (see Section 2.5). The inability to stimulate mental operations hinders a person's neurocognitive development and this consequently has an impact on the growth of his or her executive functions. Learners from affluent environments, however, are more likely to experience less difficult living conditions and to be exposed to various learning resources as compared to learners from poor environments. An affluent living environment enhances the development of cognitive, social and physical skills (see Section 2.5).

Thus, the study enquired whether poorer contexts hinder teachers' ability to develop executive functions. From the responses obtained, the participants felt that teaching in a poorer context would not impede their ability to develop executive functioning skills; although it would be more difficult, it would not be impossible to teach these skills in such a context. The reasons for this was attributed to adjusting to different learning environments, strengthening their teaching skills and the means to use different natural and recycled items found in that learning context.

Adjusting to one's learning environment implies that teachers use their surroundings to the best of their abilities. Prior to doing so, teachers would need to evaluate their environment in order to identify strengths that support the development of executive functions. Various opportunities of developing executive functioning skills can still emerge from working within a poor environment. One of the biggest challenges noted by the participants, however, is the ability to override the lack of learning resources with which to stimulate learners' cognitive skills.

The second factor that the participants mentioned in overcoming the challenges of teaching in a poor learning context involves developing teachers' teaching skills. Developing one's teaching skills is advantageous as it not only improves the delivery of the lesson but also helps teachers to manage their classrooms better. The participants advised that one of the ways by which teachers can obtain better knowledge and skills (apart from enrolling in courses) is with the help of the internet. The internet as a tool provides teachers the opportunity to grasp different ideas and

techniques to develop executive functions in their own way and according to their learning context. By furthering their knowledge and skills, teachers become uplifted with the confidence to bring about change despite the challenges they face.

The last category of the participants' responses pertains to the use of natural materials and recycled items in their lessons. This information tells us that the participants do not solely rely on store-bought stationery to develop executive functioning skills, and that natural materials or recycled objects can be applied in any learning context. The ability and creativity to use natural materials exemplify how educators can address the challenge of working even in a poor learning context. Consequently, not only do the learners gain more knowledge in being cognitively flexible, but they also learn about different objects and how these can be applied for different means.

Consequently, the participants were of the opinion that a poor learning context does not impede their ability to develop executive functions. Although the literature warns that poverty can have an impact on learners' school readiness (see Section 2.5), the findings revealed that there are alternative forms of developing and implementing executive functions in learners.

4.3.3   Measures with which to support executive functions

The third theme focused on the resources and techniques that teachers use to develop executive functions. The vital role of developing executive functions is to enable schooling adjustment and social and academic achievement; thus, executive functions would support learners with much-needed cognitive and behavioural skills so that they can concentrate better, retain knowledge and alternate solutions. This final theme thus elaborates on the measures that teachers implement to develop executive functions within learners.

4.3.3.1   Mediated learning

Because Grade R children still require explanations and examples when learning, guidance by an educator is very important at this stage. The reasons for this include learners being able to attain knowledge better when they work alongside others. The collaboration process joins different ideas and steps to learn new skills and gain an understanding of a concept (Shabani et al., 2010:238). Thus, without the help or

guide of an adult, learners would battle to comprehend and perform tasks correctly. This is why the presence of the teacher is vital for learners to develop their executive functioning skills (see Section 2.6.2).

In mediated learning, the teacher applies what Vygotsky termed "scaffolding." Scaffolding consists of interaction where knowledge is co-constructed, activities that cultivate knowledge and resources that are utilised to facilitate learning. This all-round approach prepares learners to achieve lesson outcomes by themselves (see Section 2.6.1). Furthermore, the independent learning approach is the responsibility of the learner. The literature stresses that the teacher and the learners should work together in the learning process, although teachers should play a low-key role in guiding the learners to discover or solve problems during the lesson.

According to the findings, the participants use methods such as modelling the desired behaviour in learners, practising the activity before the lesson activity and confirming that the learners understand what they are supposed to do in the lesson. These techniques again resonate with Vygotsky's scaffolding procedure (see Section 2.6.2).

4.3.3.2   Resources

Resources, according to the participants, are interpreted as different tools that enhance children's learning. These tools include natural objects or toys that allow learners to gain knowledge or practise a new skill. YouTube, pictures, counters, visual reminders, games and puzzles are all examples of different tools that enhance the concept of the lesson and allow the chance to practise learning a new skill. The literature furthermore justifies the use of various learning resources, as these enable the mind to operate flexibly. Furthermore, resources play an important role in developing executive functions because they help learners to understand what teachers are trying to teach. In the lower grades, for example, younger learners particularly benefit from working with tactile objects. This is because they get to experience their learning and learn how to manipulate a tool in order to attain a goal (see Section 2.3.1.1). For teachers, however, learning resources support the teacher to attain the lesson outcomes; this is because learning resources help plan, develop and deliver a lesson. An interesting note was that the participants did not rely on store-bought or expensive materials; instead, they made use of natural

materials and recycled objects in their lessons and created their own tools. They encouraged other teachers to do so as well.

4.3.3.3   Adequate training of educators

The data revealed that the participants felt they had received adequate training through the means of experience, in-service training and collaborative work. Referring to experience, one of the reasons the participants felt they had obtained sufficient training to develop executive function skills was due to their teaching experiences. According to the participants, experience posed to be their greatest teacher as it taught them how to handle certain learning situations, how to implement different learning techniques and how to develop and train the skills for particular lessons. Moreover, the number of years that the participants have been teaching ranges from five to 21 years; hence, this could also explain why the participants felt that their teaching experience has taught them the most (T4 and T7).

The second component that the participants mentioned had helped them was attending short training courses. Some of these training courses were certificate courses and programmes to provide the required knowledge and skills regarding implementing the knowledge in their lessons.

The participants at S2, S3 and S4 work as a team with other Grade R teachers. This group often shares ideas, techniques and tools that work well in lessons. The idea of educators working collectively also enables the profession to have a sense of partnership among educators. This assists with developing more positive relationships, work satisfaction and efficacy and reduces the workload. Hence, this technique not only benefits learners but also helps teachers develop their skills and teaching practices.

In conclusion, the participants in the study revealed that the fact that they had received added training and support from the school and had much teaching experience, enabled them to feel competent enough to develop learners' mental skills. The literature, however, discusses some of the forms by which to develop executive functions within lessons, but none of these relates to the answers the participants provided (see Section 2.2.2). The findings, therefore, reveal that Grade

R teachers have unique forms by which to develop executive functions in accordance with the needs of their classrooms.

4.3.3.4   Schooling environment

The responses provided by the participants revealed the various forms of schooling environments that support and enhance executive functions. At all of the school sites in the study, for example, the Grade R teachers had teaching assistants; this provided the support to regulate the learners and implement different learning activities for cognitive flexibility. Furthermore, the school rules indicate how learners ought to behave on school premises – for example, all the classrooms that I observed had either notice boards or posters indicating rules and regulations of appropriate behaviour; this is especially helpful in informing learners how they should interact respectfully with one another (see Section 2.2.1.2). The participants also stressed the importance of being consistent when implementing rules as this asserts the teacher's expectations and order in the school. In doing so, teachers should provide the necessary guidance by reminding learners of school rules and showing them exemplary conduct. One of the ways in which the participants implement these techniques is by having discussions where the learners share their experiences to understand better how they should treat one another. As learners learn to empathise with others, it minimises aggression and develops solidarity among the learners (see Sections 2.2.1.2 and 2.4.2).

Most of the participants stated that the most effective ways in which schools enhanced executive functions was through implementing different teaching and learning techniques. The classrooms, for example, were structured to accommodate different lesson activities, different working areas and seating in small groups. This enabled the learners to collaborate during lessons and work flexibly under curriculum differentiation; thus, the learners would be able to advance according to their capabilities (see Section 2.2.2). Consequently, the techniques that schools implement to develop executive functions are consistent with what the literature identifies as developing executive functions; this informs us that both the research and the literature base their training on daily routines and different learning activities.

4.3.3.5   Parental involvement

The participants felt that one of the reasons why some learners lack cognitive and behavioural skills is due to insufficient training at home. South Africa faces the growing challenge of inadequate schooling preparation (see Section 1.5), and this problem was highlighted in the empirical data as the participants revealed how they still had to teach certain skills at the beginning of the year. Furthermore, the literature explains that one of the possible reasons for this lies in the fact that the socioeconomic status of many families could be responsible for poor attention and learning preparation of learners (Sasser et al., 2015:681). Taken together, both the participants and the literature clarify why some learners commence formal education with poor executive functioning (see Section 1.5). This problem, however, can be prevented if learners are equipped with the required learning skills prior to commencing school; both the literature and the participants stated that it could be done with the help of the parents (see Section 2.2.2).

The study provided a platform from which teachers provided ideas to assist parents with developing executive functioning skills in their children (see Section 4.2.3.11). According to the responses, all of the participants requested that parents interact more with their children as this provides the opportunity to learn how to engage with others, discuss and learn new topics and remain attentive during conversations (which were some of the cognitive and behavioural challenges identified during the interviews – see Section 4.2.3.5). Various teachers found that parents who talk more to their children, read with them, involve themselves in their school activities and assign household chores slowly instil executive function skills in their children (see Section 4.2.3.11). Moreover, in accordance with Vygotsky's sociocultural theory, working in collaboration with an experienced adult helps a child attain cognitive and social development, which establishes executive functioning skills. Consequently, parental involvement plays a vital role in developing executive functions for school readiness, and parents need to be more active in developing executive functioning skills prior to formal learning (see Section 2.2.2).

4.4   CONCLUSION

In this chapter, the data presented by the eight participants through interviews and lesson observations were analysed and interpreted. The experience of this chapter

was very unique in that I faced various challenges and triumphs in order to obtain the data. The participants, for example, were both open and friendly in sharing their meanings and their experiences of executive functions. Transportation and scheduling, however, proved to be a challenge. The chapter commenced by outlining all the codes used in the study and detailing the descriptions of all the participants. As part of the data collection, both the interviews and the lesson observations were conducted with the eight (8) Grade R teachers in their respective classrooms. The data were gathered for analysis and then produced themes for my work.

According to the themes that emerged, the data revealed the teachers' perceptions of executive functions, the challenges they experience during lessons and the measures that support the development of the skill. By sharing their experiences, the data also revealed that the participants were very much knowledgeable about executive functions and the role that executive functions play in learning and school readiness. Furthermore, the teachers noted that they found more learners who commence school with insufficient training of executive functioning skills; thus, they are forced to spend the first part of the year training the Grade R learners to understand what it means to follow rules, procedures and routines. Although the training of executive functions presents challenges, the teachers shared that they felt very capable of developing these skills owing to their teaching experience. Moreover, the participants expressed that teachers should not be the only people involved in developing executive functioning skills, but parents also need to participate in training executive functions at home. Consequently, the final chapter (Chapter 5) will outline a summary of the research findings, conclusions and recommendations of the study.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1   INTRODUCTION

The aim of this final chapter is, firstly, to summarise the key points derived from the literature review and the empirical findings. In drawing the research conclusions, the secondary questions are answered first, followed by the main research question. Moreover, the recommendations for educational policies, teachers, parents and future studies are also provided with the intention of strengthening the development of executive functions in the Foundation Phase learner.

5.2   SUMMARY OF LITERATURE AND EMPIRICAL RESEARCH FINDINGS

The following section presents a summary of the literature that has been reviewed and the empirical findings obtained from the data.

5.2.1   Summary of key literature findings

One of the major problems noted in South African schools relates to the lack of school readiness of numerous learners, which manifests in their struggling to focus during lessons, which ultimately results in behavioural problems in the classroom. In other words, many learners who commence formal education struggle with cognitive and behavioural weaknesses (see Section 1.5). School readiness plays a vital role for early learning because without the necessary skills, learners are unable to develop cognitively and can, therefore, not perform to their full academic potential during their school career.

The literature identifies executive functions as the required cognitive and behavioural skills that enable effective learning and social cohesion at school (see Section 2.2) and, therefore, assist learners to operate successfully in a learning environment. Executive functions are hence deemed as the mental skills that permit a child to develop, plan, organise and control his or her emotions, attention and actions to reach a specific goal.

As executive functioning encompasses various skills, its three main constituents include self-regulation, working memory and cognitive flexibility (see Section 2.2). Self-regulation includes the ability to overcome and control impulsivity. Furthermore,

it sustains one's attention when acquiring information and assists in applying the necessary actions to achieve a goal (see Section 2.2.1.2). The second component relates to the working memory (see Section 2.2.1.1), which entails storing and using the information in the short-term memory. This is vital for learning because it guides learners to follow instructions or remember important information. The last aspect is cognitive flexibility (see Section 2.2.1.3), which can be defined as a mental skill that can change, redirect or compose an alternative plan towards reaching one's goal.

The pre-schooling years are the vital stage in which executive functioning skills are recognised within the prefrontal cortex. Although the literature notes that the cognitive frame plays a major role in establishing this skill, external factors, such as the surrounding environment and the influence of parents, have an impact on the development of this skill (see Section 2.2.2).

Parents were identified as important role players that need to develop these functions before the child commences with his or her school career. This is because parents teach children how to interact with others, organise themselves or clean up after a mess. Furthermore, they instil the basic values of learning and how children should take care of themselves. The environment, however, provides the opportunity for children to apply and experience what they have learnt (see Section 2.2.2). This correlates with Vygotsky's theory because his sociocultural theory affirms that for children to learn, interaction must take place (see Section 2.6). Interaction, for example, normally takes place within a specific setting. Furthermore, interaction exposes people to different ways of doing things and opens their minds to construct meanings in a different light; consequently, this enables cognitive development to transpire. However, the major reason why I applied Vygotsky's theoretical framework to my study is because it outlines how executive functions can be supported during lessons (see Section 2.6). I was able to understand that the interaction between the learner and the teacher plays a vital role in developing executive functioning skills. The Zone of Proximal Development explains the process by which learners can be guided to attain lessons outcomes (see Section 2.6.1).

As executive functions permit learning to occur, the literature review focused on the connection between executive functions and learning (see Section 2.2.3). What was

found includes the ability to organise knowledge, maintain focus and discipline, recall prior knowledge to make sense of new knowledge and, lastly, develop or adapt new ideas – these actions imply that executive functioning skills are applied when learning. Reasons listed why executive functions are vital for learning include the ability to regulate or perform tasks, organise one's own work, develop positive behaviour, accomplish work successfully and excel academically (see Section 2.2.4). Thus, the participating teachers highlighted that mental skills not only benefit children's learning while they are in school, but are life skills that enable a person to make wise choices to achieve a goal – this is why teachers advise the training of mental skills during the early years.

The literature also refers to factors that are obstacles in the development of executive functions. Poverty is identified as one of the main issues that constrain the growth of this skill (see Section 2.5). Because poverty inhibits learning opportunities, abilities such as cognitive flexibility cannot develop to their fullest capacity. Furthermore, the mental strength and storage capacity required for working memory would also be unable to hold certain amounts of details. Subsequently, the new information would take longer to store than something that is already familiar (see Section 2.5). Lastly, because self-regulation entails control over actions and attention, a weak immune system or physical frailty would result in difficulties with acquiring physical or motor skills, as well as cognitive or perceptual abilities (see Section 2.5). The prevalence of poverty also equates to the lack of additional support and learning materials because schools would not have the resources or means to develop executive functioning skills.

5.2.2   Brief overview of the empirical research findings

In my study, eight Grade R teachers participated in a case study; this took place within four private schools located in suburban Pretoria. The data were gathered by interviews, field notes and lesson observations, which were conducted at each respective school where the teachers taught (see Section 3.2.1.2). The number of learners in a classroom ranged from 20 to 25; these learners were five to six years of age. By implementing the inductive data analysis, the following findings emerged:

The first theme involved teachers' perceptions of executive functions (see Section 4.5.1). Prior to interpreting the three executive constituents, the teachers explained

what the term "mental skills" means and the important role these skills play in learning (see Section 4.5.1.1). The participants' responses revealed sufficient knowledge about what mental and executive skills entail. The data were rich in that the information held therein included different outlooks of how mental skills operate. Moreover, the teachers highlighted that mental skills not only benefit children's learning while they are in school but also are life skills that enable a person to make wise choices to achieve his or her goal; this is why teachers advise the training of mental skills during the early years.

The empirical study also found that developing executive functions can be challenging when learners lack much-needed cognitive and behavioural skills in class (see Sections 4.5.2.1 and 4.5.2.2). Cognitive challenges relate to paying attention, processing information and listening to instructions. The observational data revealed how easily learners were distracted during lessons if the teachers did not make extra efforts to keep the learners captivated in an activity. Furthermore, the learners struggled to process the actual information given in class, such as following basic instructions; this keeps many of them from accomplishing their work (see Section 4.5.2.1). Many of these challenges, according to the teachers, are based on internal and external factors that inhibit learners' learning in the classroom.

Despite the existing challenges that impede teaching, the training of executive functions through the guiding of learners assists with developing the necessary cognitive and behavioural skills that would assist learners to reach their learning goals (see Section 4.5.3.1). Vygotsky's sociocultural theory encapsulates this mediated lesson that collaborates teachers and learners in order to attain the lesson outcomes. It is evident from the empirical evidence that teachers have an organised sense of developing executive functioning skills either by demonstrating the necessary actions or guiding learners with steps to reach the lesson outcomes. With the training of the executive functioning skills, a platform is created where learners can construct their own knowledge, so that they can be less dependent on the teacher to 'feed' them knowledge. The findings also indicated that the teachers refrained from relying on purchased materials to develop executive functions, and through experience, they resorted to creative measures, such as making use of natural material and recycled objects to strengthen the delivery of their lessons (see

Section 4.3.1.7). Because the learners tend to lose attention quickly, the Grade R teachers had innovated and fun ways of training the learners' in cognitive flexibility. Most of these techniques did not rely on expensive materials but rather day-to-day materials anyone could use. This reveals that the ability to develop executive functions is not dependent on an affluent space, but poorer environments can also train and enhance mental skills (see Section 4.3.1.8).

According to the data, the development or training of executive functions mainly depends on teachers' willingness to be innovative and utilise the available resources found in their environment. Furthermore, there are added tools, such as the internet, books and social networks, that assist teachers to develop executive functioning skills in various ways. Learners, therefore, have a variety of learning resources that can expose them to learning about a concept in different ways. Most of the schools were well resourced and strived to incorporate physical activities not only to regulate their learning but also to keep them engaged in what they did. Thus, in the empirical study it was found that executive functions are well developed in Grade R classrooms (see Sections 4.4.2 and 4.4.4).

Although the school plays a major role in developing executive functioning skills, the teachers believe that parents should also play a role in enhancing the training thereof by having discussions where children are, for example, asked about their day at school. Furthermore, parents can implement routines where their children participate in house chores. It is important for parents to train their children in correctly performing certain tasks, engaging with or responding to others properly and effectively communicate their needs or frustrations, because without any of these skills, children fail to work well and engage with their peers. When parents engage with their children, this lets them feel validated enough to contribute different thoughts and participate in working activities. Ultimately, through learners engaging in household tasks and having various discussions with their parents, children's cognitive thinking skills gradually develop in their lives (see Section 4.3.1.10).

5.3   RESEARCH CONCLUSIONS

After presenting the summary of the key issues discovered during the literature review and the empirical study, the research conclusions will be drawn by answering the research questions. Hence, this section will commence by answering the

secondary research questions, followed by the primary question (see Sections 1.3.1 and 1.3.2).

5.3.1 Secondary research question 1: Why are executive functions (mental skills) important for school readiness?

Executive functions represent the foundation of school readiness as they enable children to control their behaviour, improve their memory and operate flexibly to solve a problem. These skills, therefore, assist a child in acquiring, processing and understanding new information and, as such, are the building blocks for academic success.

Executive functions are also regarded as self-regulating cognitive and behavioural skills that enable learners to attain their goals. Without executive functioning skills, learners would struggle to cope academically as they would not have the abilities to regulate behaviour. Moreover, the teacher would always have to see that the learner behaves appropriately in class and with others; this includes stopping the learner from engaging with their peers during lessons, assisting them with taking turns, guiding them in performing tasks neatly and looking to see if they have not forgotten anything. It is, therefore, crucial that these skills be taught during the preschool years. Since the literature asserts that learners need to commence formal education already having prerequisite skills, it is vital that learners commence school with the ability to work properly in class, manage their feelings and frustrations, maintain focus, arrange their work and strategize how to approach a task in different ways. Since the learning demands are increasing each year, executive functions can be regarded highly essential for learners, not only to work well but also to adjust to the learning environment.

5.3.2 Secondary research question 2: What are some of the cognitive and behavioural challenges that teachers experience during lessons?

Cognitive challenges in the classroom include loss of attention, weak information processing, poor auditory skills and language barriers. Learners who cannot exert self-discipline tend to lose interest in the lesson and engage in other activities that are not part of the lesson. The inability to process information is another challenge, which manifests in the inability of learners to understand what the academic

demands are and what is expected of them. A major challenge in schools relates to underdeveloped auditory skills, where learners do not know how to listen to the teacher. This results in repetitive explanations and loss of valuable teaching time. Ineffective auditory skills can also be linked to language barriers, which pertain to difficulties in communicating in or understanding a language. When learners battle to understand a language, such barriers lead them astray during the lesson. By being led astray, the learner loses out from engaging in the lesson and grasping vital information, which ultimately impede their ability to learn effectively.

Additional challenges include the inability of learners to regulate their emotions and physical behaviour, such as keeping their hands to themselves or sitting still on their chairs. When learners struggle to control their emotions, it may result in unacceptable behaviour, such as emotional outbursts, which can be disruptive in class. Owing to a lack of self-control, learners cannot sit still or refrain from talking or playing during the lesson.

5.3.3   Secondary research question 3: How can teachers develop executive functions during lessons?

Executive functioning can be enhanced in various ways, such as structuring the lesson outcome according to learners' individual capabilities. This is called "mediated learning," whereby teachers provide the necessary support to guide learners in achieving their own lesson objectives. These include incorporating multisensory tasks, providing visual displays, reminding learners of required steps, scaffolding activities and enabling differentiated learning. Although the teacher is required to guide learners during a lesson, learners should be given the platform to reach the lesson outcome by themselves in accordance to Vygotsky's Zone of Proximal Development.

The measures that support the development of executive functions include using different learning materials because it strengthens cognitive operations of the brain. Moreover, in-service training equips teachers with the necessary skills to develop mental skills and instil positive behaviour in learners. Working collaboratively enable teachers to support one another and share tips and resources to ensure that executive functions are developed.

5.3.4　Main research question: What are teachers' understanding and implementation of executive functions in Grade R?

The Grade R teachers defined executive functions as the involvement of cognitive and behavioural skills that children need for learning and adjustment in class. They understood these skills as consisting of processing and analysing concepts, ideas and information, whereas the behavioural skills entailed regulating actions and behaviour in favour of achieving a task. Behavioural skills deal with listening, paying attention in class and even refraining from playing when the teacher is talking. Ultimately, the use of both cognitive and behavioural skills enables learners to complete tasks and learn from the lesson. The following diagram illustrates this perspective:
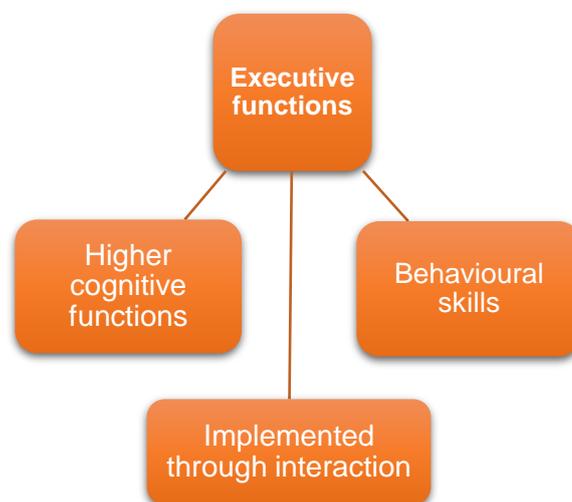
Figure 5.1:　Summary of what executive functions are and how they are implemented in lessons

Therefore, teachers apply executive functions through their interactions with their learners. Learners, for example, cannot obtain cognitive and behavioural skills without someone showing, guiding or facilitating the acquisition of these skills, which is in line with Vygotsky's theory that demonstrates that social interaction plays a huge role in instilling executive functions in children. The primary way in which executive functions are implemented is when teachers communicate what is expected of the learners by providing instructions so that the learners will know what they will be doing, what they need and how they should complete the task. This allows learners to regulate their learning and focus on what they need to do for the lesson. Modelling appropriate behaviour by demonstrating how learners should

behave during lessons and how to engage with their peers are also a method of implementing executive functions in the Foundation Phase classroom. Furthermore, it provides the opportunity for learners to participate actively in their learning, and collectively construct meaning as a group so that the class can have a common understanding of what it means to behave and treat one another properly at school.

The teachers also develop lessons that allow learners to apply self-regulatory skills, such as listening, focusing or awaiting one's turn. Letting learners perform tasks that permit them to rehearse, repeat and revise activities during a lesson enhances the growth of the working memory. Group activities and rotational work are other methods of implementing executive functions as these provide learners with the opportunity to work around different angles. Moreover, differentiated learning, small groups and different working stations allow learners to operate in different forms. This enables them to be flexible in order to apply different tools when solving problems.

Learning resources also play a vital role in implementing executive functions. Recycled materials, games, toys and crafts permit learners to construct new knowledge and develop an understanding of concepts. With learning resources, teachers often strive to use tools they have developed themselves, instead of buying the learning materials. Consequently, executive functions can be implemented in different learning and socioeconomic contexts. The ability to introduce executive functioning skills to learners relies on how committed the teacher is to creatively seeking different opportunities to instil the training of these skills.

In conclusion, the following recommendations are presented to assist teachers, parents and learning institutions with supporting the training and development of executive functions in Grade R. Moreover, further research could enable executive functions to develop in different contexts.

5.4 RECOMMENDATIONS

With reference to the findings of my research, the following recommendations are made to assist learners in attaining executive functions, not only at schools but also other contexts outside the learning environment. Thus, the following

recommendations suggest the measures educational policies, teachers, parents and further studies can take to develop executive functions.

5.4.1   Recommendations for educational policies

The subsequent recommendations are presented to guide the implementation of executive functions in the learning curriculum.

5.4.1.1   Recommendation 1: Accommodate the training of executive functions within the learning curriculum

Since it was noted that little time is being spent on developing executive functions, learning policies need to find more ways to implement executive skills in school subjects. The policies should integrate activities that promote planning, alternative thinking and metacognition in lessons. The South Africa curriculum currently has no policy that indicates how teachers ought to develop executive functions in Grade R. Thus, the policies need to find forms of supporting and guiding Grade R teachers to develop these skills in lessons. The policies will critically contribute to developing learners' cognitive and social development in class.

5.4.1.2   Recommendation 2: Training of teachers

To develop strong executive functions, training programmes and teaching practices should present ways to develop this skill. Thus, educational policies need to have measures that educate teachers to develop, apply and enhance executive functions in learners. Although some of the teachers revealed that they had attended training programmes, their training courses did not particularly focus on executive functions alone. Thus, the training programmes need to cater specifically to developing executive functions both inside and outside the classroom. By training teachers, this will not only serve their learners but will also help the teacher to understand executive functions better. The policies should introduce the concept of executive functions early in teaching courses so that when student teachers graduate, they will be more aware of the phenomenon. In this way, teachers will be able to facilitate the training of this skill during lessons.

5.4.2 Recommendations for teachers

The following recommendations are presented for teachers to develop executive functions during lessons.

5.4.2.1 Recommendation 3: Teachers should implement collaborative activities

To develop executive functions during lessons, teachers should include collaborative activities, such as having the learners work in groups, since collaborative work transfers the learning responsibility to the learners. Furthermore, working collaboratively, learners share knowledge and actively participate in the work that they are required to do. As learners engage in different opinions, this promotes the opportunity to comprehend a subject in diverse forms, which again promotes cognitive flexibly as the learners learn to consider different opinions and techniques towards solving a problem. Consequently, the learners get to manage themselves and learn how to cooperate with others, which ultimately strengthen their social interaction skills.

5.4.2.2 Recommendation 4: Alternative classroom activities should be used

Teachers should implement alternating tasks where learners get to work with different tools. In the empirical study, the participants referred this as "working stations," where these working stations consisted of different activities that the learners had to complete in the lesson. Alternating activities develop executive functions as they promote the use of higher cognitive skills through thinking and working in different forms; thus they form an important means of developing executive functions.

5.4.2.3 Recommendation 5: Teachers should instil repeated practices

Teachers need to make use of repeated activities because this practice offers many chances to train learners how to complete a task effectively. Repeated practices, in this regard, demonstrate what learners ought to do because they train learners to apply the right actions to complete a task. In doing so, the teacher needs to be clear in informing the learners what needs to be done. This type of orientation is referred to as "scaffolding". Here, teachers implement repeated practices and sequences of steps. For this to work effectively, the teacher would need to work alongside the learners, so they are able to orientate or monitor the learners' progress.

Suggestions for repeated practices in class are as follows:

- Outline each step that needs to be done.
- Break routines into smaller fragments so that learners can understand what needs to be done.
- Encourage creativity in routines by creating acronyms.
- Encourage active roles, such as learners taking turns in class activities.

5.4.3   Recommendations for parents

The following recommendations are made to make parents aware of how they can introduce executive functions in their daily routines. By doing so, children will be enabled to commence their formal education with the necessary learning skills.

5.4.3.1   Recommendation 6: Interaction between parents and their children

To improve executive functions, parents should create more opportunities to engage with their children; this can occur through conversations, storytelling or helping their children with homework. Since the participating teachers highly emphasised the need for parents to converse more with their children, parents can ask their children about their day, their school activities or any events that have taken place. The importance of having discussions is that a discussion pushes the child to reflect and add his or her opinions.

5.4.3.2   Recommendation 7: Parents should encourage physical activities

Parents continuously need to encourage their children to be more physically active as it promotes cognitive and physical development. This can be done by engaging in games, playing sports or assigning household chores to the child. Furthermore, physical activities reduce the amount of time spent watching television and using technical gadgets such as cell phones. Parents can chase their children around or play games such as hide-and-go-seek. Also, with household chores, children are given the chance to exercise certain routines to complete tasks because routines consist of repeated tasks that train children how to follow sequences.

Recommendation 8: Parents should encourage children to develop social connectedness

A supportive unit play a vital role in any person's life; thus, parents should encourage their children to develop positive relationships with friends, family members and even their teachers. Since stress was identified as a factor that hinders the development of executive functions, social support reduces the pressures of life, which will then help executive functions to develop. Social connectedness consists of opportunities that allow parents to bond with their children and train their children to develop positive relationships with others. Thus, families can embark on trips and even attend events where they get to build their child-parent relationship, which would make the child feel cared for.

5.4.4 Recommendation for further research

Although the empirical data found that teachers play a vital role in developing executive functions, what is still unknown are information on parents' involvement in developing executive functions prior to their children commencing school. Furthermore, teachers feel that learners are not being stimulated sufficiently at home; thus, when learners commence school, the teachers have to instil the necessary cognitive and behavioural skills for learners to adjust properly to the school. Thus, further research could investigate adult care support that develops executive functions in children. Moreover, studies could also explore measures and interventions that develop executive functions outside learning environments and, finally, explore the professional development of executive functions at schools.

5.5 CONCLUDING REMARKS

The aim of my study was to explore teachers' understanding of executive functions, as well as the way they implement the training of these skills in Grade R. After engaging in an in-depth study of the literature on this phenomenon, I became aware of the vital role executive functions play in establishing school readiness and academic achievement in learners. I found it disappointing to discover how many learners commence formal education with inadequate training of executive skills; this was often due to the fact that executive functions are not always recognised as learning skills. Furthermore, many social contexts do not specifically cater to

developing skills, which is one of the reasons why many learners commence formal education with an underdevelopment of executive functions. Considering these revelations, I was also surprised to find the amount of knowledge my participants revealed regarding executive functions. Although the teachers were not aware of the term "executive functions," they do train the constituents of executive functioning and find creative means to endorse these skills in their learners.

I have to admit that this was a small-scale study conducted in an urban area; thus, the findings in a rural area and maybe using a quantitative approach would render different results than those of my study. However, the study contends that executive functions can be developed in any environment, irrespective of it being rich or poor. Furthermore, parents are able to introduce executive functions early in the lives of children. By interacting more with children and assigning them household chores, children can slowly be taught forms of flowing routines, completing tasks accordingly and regulating their bodies to achieve their intended objectives. When executive functions are rehearsed on a daily basis, they facilitate the accomplishment of any work, including academic achievement. Moreover, learners establish positive relationships with their peers and in class. Thus, I end my study by arguing that executive functions need to be further enhanced and developed in Grade R in order to assist learners to attain better academic marks and socially integrate well with others.

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APPENDICES

7.1   Appendix A – Interview questions

<div style="border: 2px solid black; padding: 20px;">

<u>Interview questions</u>

</div>

The purpose of the following interview questions is to explore teachers' understanding and implementation of executive functions in grade R learners: what they perceive executive functions are; how they implement it in lessons, and the requirements needed to develop executive functions in learners.

1. What is your understanding of mental skills?

2. Why do you think mental skills is important for learning?

3. What is your understanding of:
     Self-regulation
     Working memory
     Cognitive flexibility

4. What is your view of the grade R learners' cognitive and behavioural functioning during lessons?

5. Have you experienced any cognitive and behavioural challenges that impede learning in the class?

6. As a teacher, how do you exercise the training of self-regulation, working memory, and cognitive flexibility in lessons?

7. Do you use any materials to develop these mental skills? If so, please give examples.

8. Do you think a poorer context (school) would hinder your ability to implement the training of these mental skills? Please justify.

9. In your opinion, do you feel you have received adequate training to develop mental skills with grade R learners? Elaborate on your answer.

10. Does your school environment play a role in implementing self-regulation, working memory and cognitive flexibility; how so?

11. What do you think parents can do to help develop these mental skills?

7.2   Appendix B – Teacher observation schedule

Observation schedule – (with the teacher)

1. Which of the executive constituents are evident in the lesson?

_____

_____

Remark:

_____

2. What teaching method/action does the teacher utilise to develop executive functions in learners?

_____

_____

Remark:

_____

3. What tool does the teacher use to develop executive functions?

_____

_____

Remark:

_____

4. How does the lesson support the development of executive functions?

_____

_____

Remark:

_____

5. What are the challenges that the teacher faces while developing executive functions?

_____

_____

Remark:

_____

6. How does the teacher guide her learners to get organised for the lesson?

_____

_____

Remark:

_____

7. How does the environment impact on the development of executive functions?

_____

_____

Remark:

_____

7.3   Appendix C – Learner observation schedule

Observational Checklist – (with the children)

Project: Teachers' understanding and implementation of executive functions in Grade R.

✓	**Questions to check during observation**
	Have I gained permission from the school to do my study at their site?
	Have I gained consent from the parents to use their children as participants in my study?
	Have I gained assent from the children's guardians to observe them in my study?
	Do I know my role as a participant observer?
	Will the children understand my role as participant observer?
	Will I make multiple observations?
	Will I make use of a journal over the period of observation to reflect?
	Will I make use of a journal to write descriptive notes?
	Will I make use of detailed and complete descriptions in this journal so that the field notes are detailed?
	Did I thank my participants for their contribution at the site?

Do the learners easily follow the teacher's instruction?		
Always	Sometimes	Never

Comments:
_____
_____
_____
_____

Do some of the learners go back to the teacher because of uncertainties with regard to the classwork?		
Always	Sometimes	Never

Comments:
_____
_____

_____

_____

Are the learners organised prior to commencing with the lesson?		
Always	Sometimes	Never

Comments:

_____

_____

_____

_____

Do any of the learners show indecisive behaviour during the lesson?		
Always	Sometimes	Never

Comments:

_____

_____

_____

_____

Does the teacher repeatedly call the attention of any learner?		
Always	Sometimes	Never

Comments:

_____

_____

_____

_____

Do all learners finish their work on time?		
Always	Sometimes	Never

Comments:

_____

_____

_____

_____

Do the learners work alone during the lesson?		
Always	Sometimes	Never

<u>Comments:</u>

_____
_____
_____

_____

Is any learner easily distracted from his/her work?		
Always	Sometimes	Never

<u>Comments:</u>

_____
_____
_____

_____

Do any of the learners interact with peers during the lesson?		
Always	Sometimes	Never

<u>Comments:</u>

_____
_____
_____

_____

Is there any learner who helps other learners when they are struggling?		
Always	Sometimes	Never

<u>Comments:</u>

_____
_____
_____

_____

Which skills pertaining to executive functions do learners struggle with the most?

Comments:

_____
_____
_____
_____

7.4   Appendix D – Letter of consent to principals

Faculty of Education

Department Early Childhood Education

01 February 2018

Requesting consent to do a research project with the grade R teachers

Dear Principal

I am a masters' student in Early Childhood Education at the University of Pretoria. As part of the completion of my study, I am required to interview Grade R teachers to gain their perspectives and implementation of executive functions.

My reason for conducting the study is based on numerous learners who are not ready for formal education. Studies warn that these learners stand a great chance of struggling to adjust to school, and this can highly affect their academic performance. Certain skills are needed for formal learning, and executive functions are the mental skills that improve cognitive functions in learners. My study will explore how teachers assist in the development of executive functions in Grade R, what they understand these to be, and how the skills are implemented in lessons.

I would like to request that you kindly grant me an opportunity to come and ask Grade R teachers questions surrounding executive functions. Prior to commencing with the interview, I will provide a brief session detailing what executive functions are to clarify the topic. There will be no right or wrong answers, and the name of the school will not be revealed at all. I also want to request that I may be allowed to sit in the teacher's class for a period of three hours, when I shall observe the manner in which the teacher incorporates teaching techniques in the lesson; this after the interview has been conducted. The letter of informed consent must primarily be signed by you, the principal, before teachers can take part in this research study.

Although the request to participate in the study includes interviewing the teacher and later observing lessons, teachers may choose whether they would like to participate or not. If they do participate, signing a similar letter of informed consent

will mean that the teacher acknowledges the research topic and will contribute knowledge to it. Please be assured that the identity of your school will remain anonymous during the course of the study. Pseudonyms or codes will be used when referring to your school. You may also withdraw from the study at any time, without any consequences. The professional benefits that the participating teachers will gain from participating in the study include gaining more knowledge about executive skills. Executive skills improve the cognitive capacity to retain information and control one's behaviour among peers; this is a vital tool that can enable effective learning in class. With greater comprehension surrounding the concept, teachers can work towards improving cognitive readiness and achieve academic success. Finally, this empirical work will contribute to both my master's thesis and an academic article of executive functions learning programmes. I will provide transcribed scripts of your interviews. You may edit changes up until the final stages of the writing process. The participating teachers, school principals and the university will have access to the hardcopy of this study when it is completed. I hope that this study can ultimately provide guidelines to further develop executive functions in lessons.

Please indicate whether you are willing to participate by filling in the permission slip. I shall collect these slips from your school. You are also welcomed to contact me should you have any queries.

Yours sincerely,

_____   _____

Elsa Etokabeka   **Prof MG Steyn (supervisor)**
0725385186   **mg.steyn@up.ac.za**

PERMISSION SLIP FOR RESEARCH

I, _____, in school _____, hereby give permission to Elsa Etokabeka to interview Grade R teachers and observe their lessons for a period of 3 hours, all for the purpose of her masters' research study. In participating, I understand the nature of the study and hereby give permission and ownership to not only record but also utilise the given information under the term that the identity of both the school and the teachers remain anonymous, and that participation is voluntary. Teachers may withdraw at any time during the course of the study without any consequences.

The Principal: _____

Date: _____

7.5 Appendix E – Letter of consent to teachers

Faculty of Education

Department Early Childhood Education

01 February 2018

Requesting participation in a research project.

Dear Grade R teacher

I am a masters' student in Early Childhood Education at the University of Pretoria. As part of the completion of my study, I am required to interview grade R teachers to gain their perspectives and implementation of executive functions. This is where you come in.

I would like to invite you to participate in a research project concerning executive functions. My reason for conducting this study is based on numerous learners who are not ready for formal education. Studies warn that these learners stand a great chance of struggling to adjust in schools, and this can highly affect their academic performance. Certain skills are needed for formal learning, and executive functions are the mental skills that improve cognitive functions in learners. My study will explore how teachers assist the development executive functions in Grade R: what you understand it is, and how it gets implemented in lessons. This can ultimately serve to enhance school readiness and academic achievement in learners.

Prior to commencing with the interview, I will provide a brief session detailing what executive functions are to clarify the topic. There will be no right or wrong answers, your name or that of your school, will not be revealed at all. I also want to request that I may be allowed to sit in your class for a period of 3 hours to observe the manner in which you incorporate the teaching techniques in your lesson, this after the interview has been conducted. Your principal has been informed of this study and has given his/her permission. The informed consent letter must be signed by you the teacher before taking part in this research study.

Though the request to partake in this study includes interviewing you the teacher and later observing your lessons, you may choose whether you would like to participate or not. If you do participate, signing a similar letter of informed consent will mean that you acknowledge the research topic, and will contribute knowledge to it. Please be assured that your identity and that of your school, will remain anonymous during the course of the study. Pseudonyms or codes will be used when referring to you and your school. You may also withdraw from the study at any time, without any consequences. The professional benefits that the participating teachers will gain from participating in the study includes gaining more knowledge about executive skills. Executive skills improve the cognitive capacity to retain information and control one's behaviour amongst peers; this is a very vital tool that can enable effective learning in class. With greater comprehension surrounding the concept, teachers can work towards improving cognitive readiness and achieve academic success.

Finally, this empirical work will contribute to both my master's thesis, and an academic article of executive functions' learning programmes. The participating teachers, school principals and the university will have access to the hardcopy of this study when it is completed. I hope that this study can ultimately provide guidelines to further develop executive functions in lessons.

Please indicate whether you are willing / not willing to participate by filling in the permission slip. I shall collect these slips from your school. You are also welcomed to contact me should you any queries.

Yours sincerely,

_____   _____

Elsa Etokabeka   **Prof MG Steyn (supervisor)**

 0725385186   mg.steyn@up.ac.za

PERMISSION SLIP FOR RESEARCH

I _____, am willing / not willing to participate in this research study by taking part in an interview, and allowing the researcher to observe my lessons for the period of three hours. In participating, I understand the nature of the study and in doing so, I hereby give permission and ownership to not only record, but also utilise the given information under the term that my identity remains anonymous, and that participation is voluntary. I also understand that I may withdraw at any time during the course of the study without any consequences.

Teacher: _____

Date: _____

School: _____

7.6   Appendix F – Letter of consent to parents

Faculty of Education
Department Early Childhood Education
01 February 2018

APPLICATION FOR CONDUCTING RESEARCH INVOLVING YOUR CHILD

Dear Parent/ Caregiver

I am a masters' student in Early Childhood Education at the University of Pretoria and I am currently busy with a research project entitled: "Teachers' understanding and implementation of executive functions in grade R." To elaborate on my study, executive functions are cognitive skills that control and coordinate thoughts and behaviour. In preparing learners for formal education, executive functions work towards ensuring learners have the necessary cognitive skills to learn in a school environment. For this study, I am required to interview and observe grade R teachers to gain perspectives, and note how it gets implemented in lessons.

I wish to ask your permission to include your child in this study. Your child will not be directly involved as I'll be observing the lessons to note the techniques that are used during the lessons. The learners will be observed in the classroom to determine what the children may be struggling with, and how they respond in class.

For the purpose of the research, pseudonyms (not real names) will be used in order to protect your child's identity. The research will ultimately try to determine the factors that contribute to teachers' understanding and implementation of executive functions. I also hope to use the obtained information to share with other teaching bodies within the education frame.

Should you, or should you NOT be willing to give permission, please indicate this in the slip below and return with your child to school. You are also welcomed to contact me if you have any queries regarding the study.

Kind regards.

_____

E. Etokabeka

RESEARCHER

0725385186

PERMISSION FOR RESEARCH

Your child's participation in this research is voluntary and confidential. The school and your child's name will not be identified within the research. If you have any questions about the research, you are welcome to contact me, Elsa Etokabeka, 0725385186.

I, _____, parent/guardian of _____ in grade _____ give permission that Elsa Etokabeka can use my child as a participant for her research study.

_____   _____

Signature of parent/guardian   Date

OPT OUT FORM

I, _____, parent/guardian of _____ in grade_____ **DO NOT** give permission for Elsa Etokabeka to use my child as a participant for her research study.

_____   _____

Signature of parent/guardian   Date

7.7 Appendix G – Poster that elaborates and simplifies executive functions

Executive functions operate as a mental COP (Controller, Organiser and Planner) that implements a needed structure to execute tasks.

Just as a police officer implements law and order, executive functions regulate our emotions, attention and behaviour so that we humans can obtain our objectives.
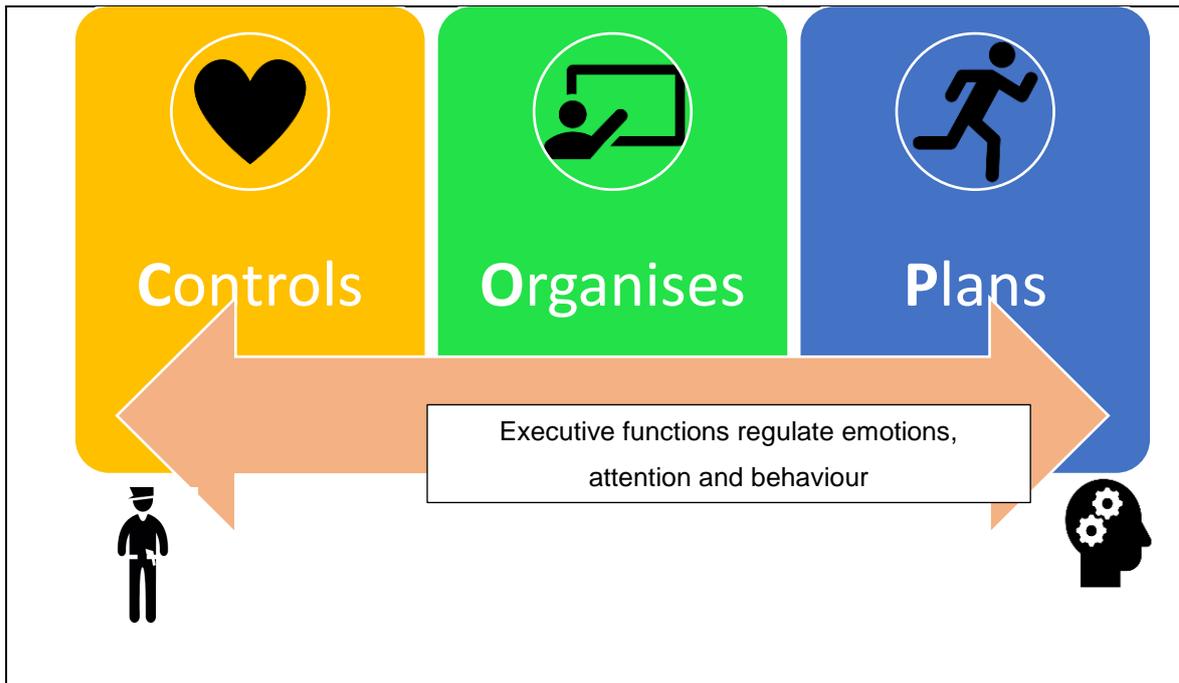
HERE IS WHAT TO THINK ABOUT BEFORE STARTING A NEW TASK:

1. **STOP**
   - Stop what I am doing.

2. **THINK**
   - What do I need to do?
   - Do I have a checklist that I can use?

3. **PLAN**
   - Plan the steps needed to finish the task.
   - Fill out the checklist that I can use.

4. **DO**
   - Sit down and start working!

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Results

4	Working Memory	The ability to remember information for immediate use.
1	Organizing Materials	The ability to organize objects in work, play, and storage areas.
2	Planning Tasks	The ability to manage tasks by setting goals and developing steps to achieve the goals.
6	Emotional Control	The ability to regulate emotional responses to stress.
1	Initiating Work	The ability to get started on tasks without many prompts and cues.
4	Inhibiting Behavior	The ability to stop one's own behavior at an appropriate time.
4	Monitoring	The ability to judge the quantity and quality of one's work based on expected standards.
5	Shifting to New Tasks	The ability to transition from one activity to another.

Higher scores may indicate your strengths in Executive Functioning.
Results Lower scores may highlight areas of weakness.

Continue