

## TEACHERS' EXPERIENCES OF EXECUTIVE FUNCTIONS IN GRADE R

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### Abstract

Numerous Grade R learners in South Africa are not ready for formal education. Teachers' low qualifications are linked to learners' inadequate development of executive functions in Grade R. As a result, preschool children commence formal schooling without the necessary executive functions, which causes unsuccessful adaptation in the formal school. This lack of executive functioning skills has a negative and everlasting impact on children's schooling. The study included eight Grade R teachers from four private schools, who had experience in teaching executive functions. In doing so, it examined preschool teachers' experiences of executive function skills in Grade R lessons. Vygotsky's sociocultural theory served as a mediating framework that fosters the development of executive functions in learners. In the end, the results indicated that cultivating executive functions can be challenging when pre-schoolers lack essential cognitive and behavioural skills in the classroom. The paper holds potential benefits for the preschool learning environment, promoting school readiness, as well as contributing to improved academic achievement in children.

**Keywords:** Adaptation; Executive Functions; Poor Academic Achievement; Preschool Children; Preschool Teachers

### Introduction

Many Grade R teachers in South Africa possess the minimum qualifications needed to perform their duties and responsibilities in schools. The inadequate qualifications of Grade R teachers have a great impact on learners' ability to successfully accomplish learning in the classroom. Teachers with low qualifications struggle to develop executive functions in Grade R learners. This causes a dilemma because many Grade R learners in South African primary schools have not yet obtained the cognitive and behavioural skills needed to succeed in school (Bruwer, Hartell & Steyn, 2014). Consequently, they commence formal schooling without the necessary executive functions, which poses a challenge for their successful adaptation to the formal school environment. These learners struggle to solve problems, make decisions, wait for their turn, and regulate their behaviour. This illustrates that their physical, cognitive, and emotional aspects have not yet fully developed and they are not ready for a solid start of formal schooling. A lack of executive functioning in Grade R learners predicts learning problems and poor academic achievement (Samuels, Tournaki, Blackman & Zilinski, 2016, p. 478). For every 100 learners who started school in 2013, only 51 successfully passed matric. Moreover, only 16 out of every 40 learners enrolled at university (Spaull, 2014).

Thus, to prevent this problem, learners need to begin school with essential skills that allow them to take part in classroom discussions. Executive functioning can be understood as the prime cognitive regulator that controls other operations such as behaviour and attention (Cooper-Kahn & Dietzel, 2008). As executive functioning enables learners to acquire the organisational and cognitive skills necessary for reading and writing in the classroom, it predicts academic achievement. Executive functions are a set of cognitive functions that are crucial for successful adaptation in a classroom (Sasser, Beekman & Bierman, 2015).

Education during the early years is pivotal to establishing a solid foundation, as this marks a continuous pattern from which a child draws the skills to grasp knowledge (Fitzpatrick, 2014). It is important for Grade R teachers to understand executive functions in Grade R to ensure that learners acquire cognitive abilities such as independence, retaining information, following instructions, and constructing own meaning (Sasser et al., 2015). However, as mentioned before, Grade R learners in South Africa are ill-prepared for formal learning. Their cognitive and behavioural skills are not well developed for learning and effectively adjusting to school (Fitzpatrick, 2012). The article aimed to raise awareness of executive functions, as well as convey firsthand experiences of Grade R teachers in their classrooms. If teachers are aware executive functions, Grade R learners' cognitive skills can be improved prior to the commencement of formal schooling, which would be Grade 1 in this case (Esterhuizen, 2012).

Although Grade R teachers may subconsciously address the development of executive functioning in Grade R learners, many Grade R teachers have not yet formally developed interventions to assist them in the training of executive functions. This illustrates that teachers require support to develop executive functions in Grade R learners (Snowman & McCown, 2011). Teachers need to develop executive functions in Grade R learners through "intellectual stimulation, emotional well-being, a supportive learning environment, encouraging self-discipline, setting boundaries and realistic goals" (Esterhuizen, 2012, p. 72). Furthermore, they can formulate tasks that may enable Grade R learners to succeed academically.

Previous research on this phenomenon focused on the development of executive functioning in six-year-old children in the American context (Diamond, Burnett, Thomas & Munro, 2007); however, none of these studies specifically address the preschool child in the South African context. Within the South African school system, a significant number of learners enter Grade 1, but a considerable proportion drop out before completing their final year of school. Merely 16 out of 40 learners who finish their schooling manage to attend university. Bruwer et al., (2014, p. 23) highlight that some of the reasons for poor school performance are linked to inadequate learning experiences resulting from poverty and environmental limitations. Academic underperformance is also attributed to a deficient foundation in metacognition, encoding skills, and the storage and application of learning context schemas. Consequently, when information is not meaningfully stored, it becomes irrelevant to the learner, leading to academic struggles (Snowman & McCown, 2011). Supporting teachers in developing executive functions is an aspect that receives limited attention (Snowman & McCown, 2011).

This is primarily because most preschools have not formally implemented interventions to aid the training of executive functions. Therefore, this article provides insights into teachers' experiences of teaching executive functions in Grade R, with the aim to enhance school readiness and achieve academic success.

## **Literature Review**

Executive functions encompass a mental plan that applies cognitive and behavioural skills to task performance (Doebel, 2020; Doebel & Müller, 2023). These functions entail the cognitive effort of regulating thoughts and actions to achieve the objective of reaching a goal (Smid, Karbach & Steinbeis, 2020). The term "executive" indicates involve higher mental operations. These operations govern thoughts and responses to situations, emphasizing the influential role of higher mental processes in most human operations (Johann & Karbach, 2020; Smid et al., 2020). Beyond regulating as well as coordinating thought and behaviour, executive functions also involve gathering relevant information by sifting its details. Gathering and examining information is crucial as these actions help children to analyse their environment, as well as make informed choices. For instance, children at school need the ability to analyse the "bigger picture or major themes, and the relevant details including shift back and forth between the two" (Meltzer, 2010, p. 6).

Research has shown that many learners who are struggling to cope with learning demands at school have challenges related to literacy and passing mathematics (Ribner, Willoughb, Blair & The Family Life Project Key Investigators, 2017). Cortés Pascual, Moyano Muñoz and Quílez Robres (2019), ascribes these challenges to children being ill-prepared for formal learning. The authors point out 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 (Morgan, Farkas, Wang, Hillemeier, Oh & Maczuga, 2019). Hence, when children commence with formal education without the required cognitive and behavioural skills, their capacity to learn effectively is compromised (Johann & Karbach, 2020). To comprehend the term executive functions, the subsequent section delves into the three primary components of the word, this includes the working memory, inhibitory control, and cognitive flexibility (Doebel, 2020). The components constitute the foundation for acquiring, storing, and manipulating information essential for the learning process.

### ***Working Memory***

Commencing with the working memory, working memory is where the information of performing tasks is stored. The "working" element refers to information that can immediately be recalled by carrying out a specific action, which includes remembering (Sala & Gobet, 2020). There is a difference in the relationship that working memory has with short-term memory, as compared to long-term memory (Diamond & Ling, 2020). Short-term memory relates more to working memory because it holds information that will immediately be used (Zelazo et al., 2017). Long-term memory, on the other hand, holds information that is utilised both currently and in the future.

Finch (2019) have identified two ways in which the working memory gathers information; one is through visual information, and the other is through verbal senses. This means that children remember better when they use both their auditory and visual skills.

### ***Inhibitory Control***

Secondly, the inhibitory control involves the human ability to be self-disciplined, for example to regulate actions and behaviour in favour of attaining a goal (Baron, Evangelou, Malmberg & Melendez-Torres, 2017; Sánchez-Pérez, Fuentes, Eisenberg & González-Salinas, 2018). Inhibitory control is important for learning because it enables learners to grasp knowledge and complete their work (Duckworth, Taxer, Eskreis-Winkler, Galla & Gross, 2019; Gerst, Cirino, Fletcher & Yoshida, 2017). Heatherton (2011) notes that “without inhibitory control, children 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” (p. 11). Hence, Heatherton (2011) postulates that inhibitory mechanisms enable a child to change unacceptable behaviour, for example by refraining from talking in class and making the decision to listen to the teacher instead.

### ***Cognitive Flexibility***

Lastly, cognitive flexibility deals with the way in which the mind can use different concepts and develop various ideas to solve a problem (Deunk, Smale-Jacobse, de Boer, Doolaard & Bosker, 2018). 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” (Barak & Levenberg, 2016, p. 40). The mind is flexible when it can attain, assemble, or manipulate information from the environment (Braem & Egner, 2018). The advantage of cognitive flexibility is that, as children develop their problem-solving skills, they are able to excel academically and accomplish tasks by collaborating with others (Gordon, Smith-Spark, Henry & Newton, 2018). It is worth noting that cognitive flexibility operates well with the help of the working memory.

### ***Reasoning in Preschool Years***

Grade R falls within the pre-operational stage, as it covers children between two and seven years of age (Gerst et al., 2017; Smid et al., 2020). According to Levine and Munsch (2016), children past the preoperational phase logically reason in accordance with inductive or deductive reasoning. The difference between these two forms of reasoning is that inductive reasoning concludes with a general opinion, whereas deductive reasoning ends with a specific notion in mind (Levine & Munsch, 2016). Taken together, Piaget (as cited in Levine & Munsch, 2016) found that neither inductive nor deductive reasoning could be confirmed during the preoperational phase; instead, transductive reasoning was noted to be present. Transductive reasoning occurs when casual links are formed, which means that preoperational children “may base their conclusions on a set of unrelated facts” (Levine & Munsch, 2016, p. 289).

Furthermore, children in the preoperational stage associate events that occur in the same period to explain one another (Levine & Munsch, 2016). This essentially means that the preoperational child solves problems based on associations (Peng & Kievit, 2020). Moreover, 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, p. 156). Egocentrism results in the preoperational period because children’s logic has not yet developed fully (Smid et al., 2020).

### **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 (Diamond, Lee, Senften, Lam & Abbott, 2019; Ferguson, Brunson & Bradford, 2021). The presence of executive functions is noticeable when children can select, respond to, and develop ideas of their own (Doebel, 2020; Nesbitt & Farran, 2021). From the age of two up until seven, children exercise control over their actions and the environment when they select items or respond through actions such as picking up an item they desire (Ahmed, Tang, Waters & Davis-Kean, 2019). 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 (Gordon et al., 2018).

### **How Executive Functions Permit Children to Learn**

Children “need to plan, focus attention, and remember past experiences” (Clements, Sarama, & Germeroth, 2016, p. 80), which are all constituents of executive functioning. Executive functions permit learning to occur because they support the attainment of knowledge in various subjects (Sánchez-Pérez et al., 2018; Willoughby et al., 2019). To illustrate this, there is a correlation between learning and working memory, inhibitory control, and cognitive flexibility. Inhibitory control optimises learners’ focus and disciplines them to complete their work during lessons (Gunzenhauser & Nückles, 2021). 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 (Peng & Kievit, 2020; Sánchez-Pérez et al., 2018).

### **The Importance of Executive Functions for Learning**

According to Van Rensburg (2015), “children entering Grade 1 should be able to understand the concepts used at the school” (p. 2). Executive functions prepare children both to learn and to succeed academically (Amed et al., 2019; Gordon et al., 2018). The importance behind introducing executive functions during the early years is, firstly, that it equips learners to adapt to school. Secondly, learners then have the necessary pre-skills, which results in their encountering fewer problems that impede their learning and functioning in the formal learning environment (Cortés Pascual et al., 2019). Formal learning requires children to execute tasks daily.

It is important to develop executive functions to enable learners to regulate their own learning by organising and planning their work to complete tasks successfully (Gunzenhauser & Nückles, 2021). The absence of executive functions would result in disorganised, lawless, messy conduct, engaging in risky behaviour, inhibited learning, and ultimately, poor academic performance (Ribner et al., 2017; Willoughby et al., 2019).

### **The Theoretical Framework**

The theoretical framework of this study was centred on the application of Vygotsky's sociocultural theory, which places emphasis on adults scaffolding information for children to acquire specific knowledge and skills (Vygotsky, 1986). Vygotsky's sociocultural theory notes that adults serve as guides in fostering beliefs, customs, and skills in the development of children (Louis, 2009). According to the theory, children "learn a new skill by the adult who models and structures the learning experience" (Louw & Louw, 2007, p. 26-27) – this is recognized as the Zone of Proximal Development. Since children cannot autonomously grasp the principles of executive functions on their own, a facilitator becomes the bridging force that connects the known and the unknown. In this context, the teacher serves as a medium, guiding learners to develop executive functions by scaffolding them to acquire various skills. Therefore, Vygotsky's sociocultural theory serves as a guiding framework for the study, facilitating an understanding of the knowledge and experiences teachers have with executive functions during lessons.

### **Research Methods**

The aim of using the interpretative paradigm was to enable teachers to share the experiences of what executive functions entailed, especially in learning (Cohen, Manion & Morrison, 2011). The idea behind exploring executive functions 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 (Esterhuizen, 2012). Teachers' experiences of executive functions in Grade R can be studied from the positivist paradigm, which holds that knowledge gained is objective and quantitative. However, the researchers decided against the positivist approach because the experiences of executive functions in Grade R are personal and subjective in nature (Babbie, 2014). Instead, the focus of this study sought to understand meanings the participants assigned to experiences and activities.

The qualitative approach was relevant for this research study to provide space for Grade R teachers to narrate their lived experiences (Maree, 2016) and understanding of executive functions in Grade R. It was appropriate to use a qualitative approach as it allowed the researchers to collect rich, in-depth data on teachers' experiences of executive functions in Grade R. Although the data were collected from a relatively small population of 40 Grade R teachers, it was advantageous for the researchers to identify the participants' values and beliefs that underlay the focus of this research (Fouché & Delpont, 2002).

This empirical study purposefully involved eight Grade R teachers who had degrees or diplomas in the teaching profession (Creswell, 2016). The participants must have taught at different schools, specifically in the Foundation Phase, for more than four years. The period of four years was important with regard to the knowledge and experience teachers would have gained from working with and developing Grade R learners. Furthermore, a case study design was employed to gather rich data and a deep perspective (Marshall & Rossman, 2016) of teachers' understanding of executive functions.

The study took place at four different private schools located in an urban area. These schools were located in an area convenient for the researchers in terms of easy accessibility and availability, which allowed the researchers to commute to the schools for interviews and lesson observations without difficulty. The researchers scheduled meetings with the participating teachers at any time of the day that suited them and made their participation as comfortable as possible. The principals of the four schools were asked for permission to conduct the empirical study (Creswell, 2009).

Eight Grade R teachers were interviewed and observed in their natural settings. This was advantageous for the researchers to develop an understanding of the teachers' perspectives and experiences of executive functions in Grade R (McMillan & Schumacher, 2006). The interaction between the researchers and the interviewees enabled relationships to be formed, as first-hand experiences and knowledge were shared. Participating in the natural environment of the teachers and learners enabled the researchers to observe and note their actions and conversations in order to better understand the research concept (Bryman, 2001). The researchers collected data through semi-structured interviews, lesson observations, and writing field notes during the observations. These methodologies were crucial for the study as they allowed the researchers to note firsthand experiences of executive functions during lesson activities (Creswell, 2016, p. 117). The study employed semi-structured interviews as a data collection method, posing the necessary questions around Grade R teaching, as well as providing the participants with an opportunity to share their experience of developing executive functions. In observing both teachers and learners in the school setting, the study obtained an opportunity to analyse various teaching approaches, as well as determine whether lessons yielded similar or distinct learning experiences.

Although the researchers were insiders during the interviews, they remained outsiders in the learning environment during the observations (Corbin & Strauss, 2015). The participants were interviewed and observed based on their teaching experience in training Grade R learners in executive functions and developing their cognitive and social skills; the two factors stated pertain to the executive functioning and learning skills of learners. Prior to conducting the interviews, a session was held with the teachers to enlighten them about the term "executive functions". This was done to assist those teachers who were unaware of the term although they might practise the training of executive functions in lessons. The observations were conducted for a period of three hours, and the interviews were held for approximately 45 minutes each.

The data were analysed by developing clusters of information based on words, sentences, and examples the participants shared. These clusters of data were then grouped to form themes. In order to ensure the protection of identities and personal information, the names of the participating teachers and schools were anonymised according to codes. Also, the names of the learners mentioned during the interviews were omitted and changed into pseudonyms in the typed transcripts.

## **Results**

Major problem in South African schools, according to the participants, is the lack of executive functions among numerous learners. These learners struggle to focus during lessons, which ultimately results in behavioural problems in the classroom. One teacher explained the following regarding the learners in her class:

*They can't process the actual information. And we do, we see it a lot now ... the children don't concentrate ... but what I've also experienced is that sometimes some of the children don't concentrate ... children struggle to do things for themselves. (T1).*

These results give an indication that Grade R learners are struggling to concentrate and perform the learning activities in the classroom. This was evident in another teacher's interview excerpt:

*[Learners] are not fully in control [of cognitive and behavioural skills], and they have no concept that [cognitive skills] all relate to how they behave. (T2)*

Many learners who commence formal education struggle with cognitive and behavioural weaknesses. The following was revealed during the interviews:

*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[ing] that they can't just run riot; we have rules and boundaries and so on. (T3)*

This excerpt illustrates that learners cannot do as they please at school; however, Grade R learners are not yet able to regulate their behaviour in the classroom. T3 suggested that Grade R learners failed to realise how their cognitive skills affected their behaviour. This is justified through the following examples given by the teachers:

*Weak cognitive skills affect learners' behavioural control ... without the ability to analyse their actions in a setting, learners fail to regulate their behaviour and respond appropriately. (T4)*

*I had to call the learners' attention various times to settle them down. Some of the learners also have challenges with sitting still. (T5)*

School readiness also plays a vital role in early learning because without the necessary skills, learners are unable to develop cognitively and, therefore, cannot perform to their full academic potential during their school careers. As executive functions permit learning to occur, the results suggest a connection between executive functions and learning, which includes the ability to organise knowledge, maintain focus and discipline, recall prior knowledge to make sense of new knowledge, and lastly, develop or adopt new ideas. All these executive functioning skills are necessary during the learning process in Grade R. One participating teacher explained as follows:

*“It’s the fundamentals of learning. Uhm, if they don’t have the [sic] 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.” (T6)*

The results highlight the importance of mental skills in learning, as these skills are necessary for learners to perform their tasks. The teachers pointed out that mental skills not only benefitted children’s learning while they were in school, but were life skills that enabled a person to make wise choices to achieve a goal; this is why teachers advise the training of mental skills during the early years. This was illustrated as follows:

*“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 other skills, like their social skills, become avenues that [children] either excel in or become problem areas.” (T7)*

These results suggest that when 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. Moreover, the participating teachers reported that developing executive functions could be challenging when learners lacked much-needed cognitive and behavioural skills in class. Cognitive challenges relate to paying attention, processing information, and listening to instructions. One teacher stated:

*“Learners do not 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.” (T8)*

The results indicate that learners are distracted during lessons if the teachers do not put in extra effort to keep them engaged in an activity. One teacher gave the following explanation:

*“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 [sic] things around them.” (T7)*

Furthermore, learners struggle to process the actual information given in class, such as following basic instructions, which keeps many of them from doing and completing their work. This illustrates that Grade R learners are ill-prepared for formal learning. Their cognitive and behavioural skills are not sufficiently developed for learning or adjusting effectively at school.

## **Discussion**

Executive functions include the cognitive and behavioural skills that enable effective learning and social cohesion at school and, consequently, assist learners to operate successfully in the learning environment. However, this empirical study indicates that learners experience cognitive challenges in the classroom, including loss of attention, weak information processing, poor auditory skills, and language barriers. According to the participants, numerous learners struggle with self-discipline and ultimately tend to lose interest in the lesson and engage in activities that are not part of the lesson. This illustrates that many learners are struggling to cope in class in that their behaviour does not allow them to learn effectively. In this study, it was apparent that those learners distracted their peers and made teaching difficult for their teachers.

Attesting to this matter, the literature states that many Grade 1 learners commence formal education with a short attention span, hyperactive behaviour, and displaying impulsive behaviour in and around the school (Jackson & Cartmel, 2010). The literature reveals that many South African learners are failing to pass Grade 1 (Jackson & Cartmel, 2010). 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 (Spaull & Kotze, 2015). When learners struggle to process the actual information given in class, such as following basic instructions, it keeps them from doing their work. Their inability to process information manifests in their inability to understand what the academic demands are and what is expected of them.

As the preschool years are the vital period in which executive functioning skills are developed within the prefrontal cortex, the training of executive functions is imperative for effective learning, as well as social cohesion at school. The environment in which learning takes place is important too, as it provides the opportunity for children to apply and experience what they have learnt. This correlates with Vygotsky's sociocultural theory, as it affirms that for children to learn, interaction must take place (Dishion, 2016). Interaction normally takes place in a specific setting, 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 (Dishion, 2016; Duval et al., 2017).

In this study, it was seen that the learners struggled to process the actual information given in class, such as following basic instructions. This kept many of them from doing their work. Their inability to process information manifested in their inability to understand what the academic demands were and what was expected of them.

This indicates that many Grade R learners in South Africa lack cognitive and behavioural skills in the classroom. Hence, their behaviour results in repeating explanations and the loss of valuable teaching time.

In combating the above-mentioned delays to effective learning, executive functions need to be enhanced and developed in Grade R to assist learners in attaining better academic marks and socially integrating well with others. This can be explored through play-based learning.

## **Conclusion**

After engaging in an in-depth study of the literature on this phenomenon, the researchers became aware of the vital role executive functions has in establishing school readiness and academic achievement in learners. The researchers found it disappointing to discover how many learners commence formal education with inadequate training of executive skills; often due to the fact that executive functions are not always recognised as learning skills. Moreover, the researchers were surprised to discover that the participating teachers did not know the term “executive functions”; hence, they did not have adequate training to teach learners cognitive and behavioural skills in Grade R.

The limitations of this study involved the use of a small sample and that the researchers could not generalise the findings of the study. Future studies should focus on young children’s perceptions of the transition to school to obtain in-depth perspectives of children’s experiences of starting school. Secondly, further studies can explore measures and interventions that can be used to develop executive functions outside the learning environment, as well as the professional development of executive functions in preschools. Furthermore, it is necessary to delve into the strategies that early childhood education teachers can use when facilitating executive functions in the classroom.

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