

CHAPTER TWO

COGNITIVE DEVELOPMENT OF THE GRADE R-LEARNER AND DYNAMIC ASSESSMENT

2.1 INTRODUCTION

The necessity for cognitive education at pre-school level can no longer be denied. This is due to the fact that it is imperative to develop cognitive skills during the first few years of young learners' lives, since they absorb an enormous amount of information during their pre-school years (*cf.* 1.1) (Lerner & Johns, 2009:247; Meier & Marais, 2007:191; Rademeyer, 2007:2; Lerner, 2006:220; Dunn, 2004; Van Hamburg & Swanepoel, 1987:86-87). The aforementioned authors argue that if opportunities are missed for young children to develop cognitively (intellectually), emotionally and socially during these critical years, precious learning time is lost. It is therefore of utmost importance to optimise young learners' cognitive development before they commence with formal education in Grade 1. Chapter Two investigates various facets of the Grade R-learner's cognitive development.

Chapter Two investigates various facets of the Grade R-learner's cognitive development, namely:

- Cognitive development: a concept clarification.
- Cognitive development of the Grade R-learner.
- Deficient cognitive abilities.
- Cognitive development in the South African curriculum.
- Learning theories for enhancing cognitive development.
- The importance of cognitive development.
- Assessing cognitive development.
- Approaches to cognitive development.

Before embarking on a study in cognitive development, I had to acquaint myself with what exactly cognitive development entails. The following section reports on my findings from the literature review.

2.2 COGNITIVE DEVELOPMENT: A CONCEPT CLARIFICATION

According to Donald *et al.* (2010:58), Robinson & Lomofsky (2010:34-5), Meier & Marais (2007:191), Rademeyer (2007:2), Lerner (2006:220), Dunn (2004) and Van Hamburg and Swanepoel (1987:86-87), the cognitive development of pre-schoolers (age three to six years) depends on information received through their senses, as well as their interpretation of information. Lerner and Johns (2009:153) and Papalia *et al.* (2008:10) assert that cognitive development can be defined as patterns of change in mental abilities or skills, such as learning, attention, memory, language, thinking, reasoning and creativity.

The development of thinking processes and skills is needed in order to think, solve problems, make decisions effectively and transform passive, dependant learners into active self-motivated students who can apply their learning in a wide range of real-life contexts (Donald *et al.*, 2010:58; Eggen & Kauchak, 2010:30; Benjamin, 2009; Lerner & Johns, 2009:164; Brewer, 2007:29; Feuerstein *et al.*, 2007:23-24; Donald *et al.*, 2006:20; Tzuriel, 2001:50-55; Bandura, 1986:485).

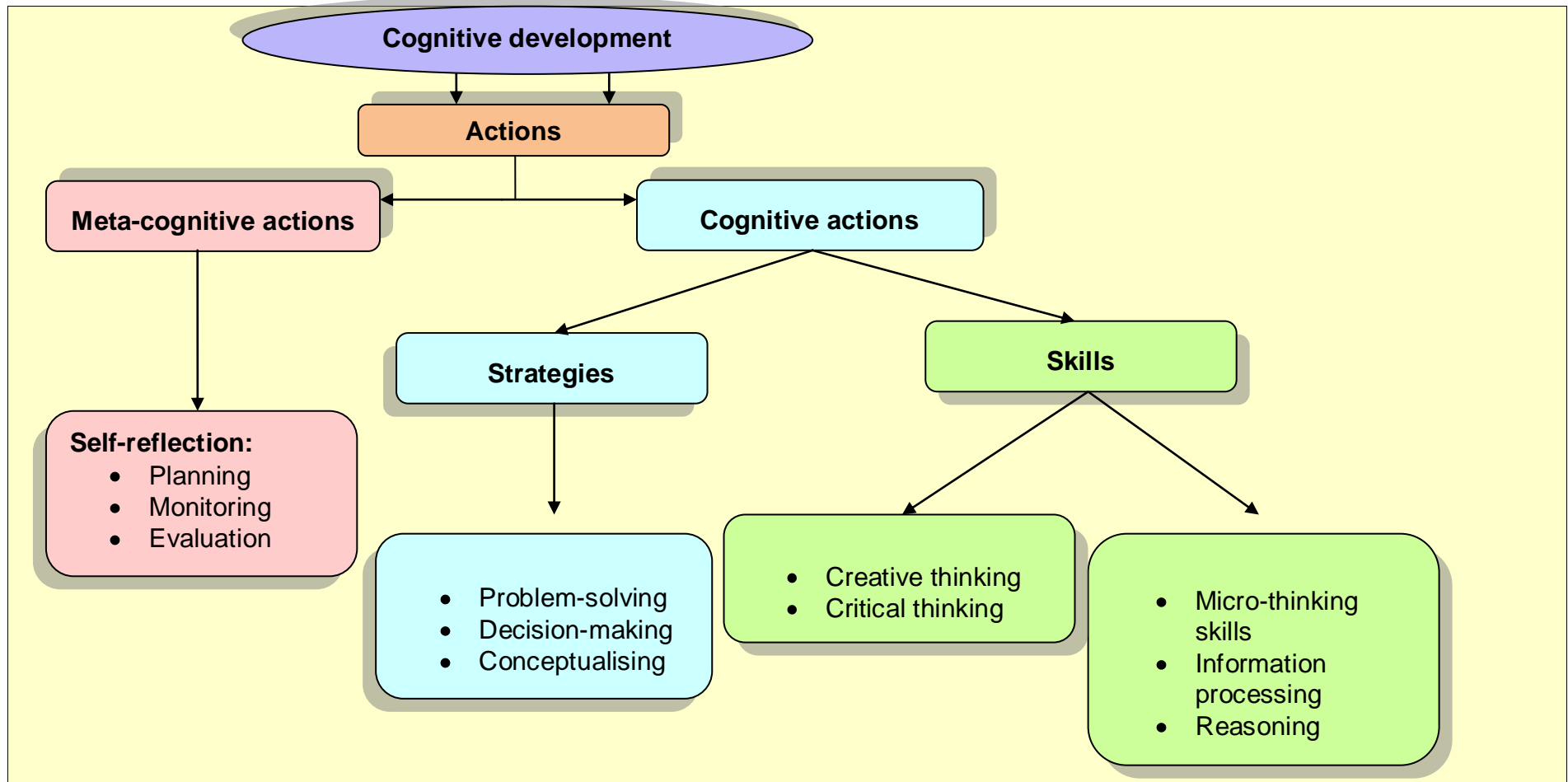
Flowing from the above I conclude that, cognitive development *inter alia* refers to the development of thinking and reasoning skills with the purpose to develop self-regulated individuals. When cognitive development takes place, cognitive changes occur because of learning, maturation and experience (Eggen & Kauchak, 2010:30). It is therefore clear that an enriched living and learning environment will encourage more connections between the neurons of the brain and creates more possibilities for solving problems, which will contribute to cognitive development. An enriched living and learning environment can be described as a developmentally appropriate environment that offers various active and stimulating experiences that provide increased connections in the brain as well as a reduced level of stress hormone (Brewer, 2007:32; Gallagher, 2005:12).

Donald *et al.* (2010:218), Brewer (2007:29), Donald *et al.* (2006:26), Wegerif (2006:2), Bjorklund (2005:3), Louw *et al.* (2004:10) and Sangwan and Chhikara (2003:75) add that cognitive development involves the acquisition of

higher mental processes involving the awareness, recognition and understanding of information in the world around us. Furthermore, these mental processes guide the **acquiring, understanding** and **modifying** of information and include all mental activities such as sensing, perceiving, constant behaviour, spatial relations, conceptualising, classifying, categorising, reasoning, remembering, symbolising and problem-solving.

The literature review revealed that cognitive development is a complex phenomenon consisting of specific actions that involve the application of cognitive and meta-cognitive skills and strategies, as synthesized in Figure 2.1.

Figure 2.1: Cognitive development



The various components of cognitive development as depicted in Figure 2.1 indicate that cognitive development is a complex phenomenon. Each of the components is reviewed in the sections below.

2.2.1 Meta-cognitive actions

Meta-cognition can be delineated as a person's awareness of and control over his cognitive processes, meta-attention and ability to pay attention (Donald *et al.*, 2010:82; Eggen & Kauchak, 2010:217; De Witt, 2009:14,55; Lerner & Johns, 2009:172-175; Meltzer *et al.*, 2007:165; Feuerstein *et al.*, 2007:23; Robson, 2006: 70, 80-83; Bjorklund, 2005:167; Kozulin *et al.*, 2003:3). According to my understanding meta-cognition includes an individual's conscious awareness of his own thinking and knowledge, as well as of others. This brings about the ability to infer mental states in ourselves and in others in order to understand that other peoples' thoughts, beliefs, feelings and desires may differ from our own and that these can change over time.

Meta-cognition is still emerging in the young child between the ages of four and six (Robson, 2006:84; Botha, 2003:276). Closely related to meta-cognition is self-regulation, which is an intentional action. Intentional meta-cognition develops from the age of three when children learn how to learn, solve problems and correct themselves (self-regulation) (Robson, 2006:84; Botha, 2003:276).

Meta-cognition can be developed by making the child aware of **what** he⁴ thinks and **how** he thinks. Pre-school learners should be exposed to developmentally appropriate practices (DAP) (knowledge of learner's needs and capabilities at different developmental levels and learning) where they can acquire knowledge about how they learn in order to further develop their meta-cognition abilities and strategies (Eggen & Kauchak, 2010:219; Brewer, 2007:4; Robson, 2006:84-85; Botha, 2003:276). This can for example be achieved by asking learners to purposefully question the way they are working when completing a task:

⁴ Although the male gender form is utilized, "he" also includes female participants.

- predict consequences of actions or events; (What will happen if I do it like this?)
- check results of their own actions (Did it work?);
- monitor their ongoing activity (How am I doing?);
- do reality testing (Does this make sense?); and
- co-ordinate and control deliberate attempts to learn and solve problems.

Due to various studies that report on the lack of meta-cognitive awareness in older learners (Eggen & Kauchak, 2010:219; Peverly, Brobst & Graham, 2003:340), and because of South African learners' inability to think analytically, even at an elementary level (Bolani *et al.*, 2007:2-4), I believe the sooner these skills can be developed (as soon as pre-school), the better learners will perform and fulfil the Department of Education's aim to build a prosperous, democratic and internationally competitive country where creative and critical citizens can lead purposeful lives in a safe and prejudice-free environment (Department of Education, 2002:1). It was therefore crucial to focus on the development of meta-cognitive skills in my intervention programme, because research has shown that children, who are aware of the way they study and learn, perform better than those who are less aware (Eggen & Kauchak, 2010:217; Papalia *et al.*, 2008:365-366; Bjorklund, 2005:168; Kuhn & Dean, 2004:268).

In addition to the acquisition of meta-cognitive actions, cognitive development also refers to the development of cognitive actions.

2.2.2 Cognitive actions

Brewer (2007:29), Nieman and Pienaar (2006:78-79), Robson (2006:9) and Van Staden (2005:50) are of the opinion that cognitive actions are thinking actions which are regarded as mental activities that include reasoning, decision-making and problem-solving. It is important for educators to understand the cognitive actions of learners in order to develop appropriate learning experiences. These cognitive actions consist of **cognitive strategies** and **cognitive skills**, which will be dealt with in more detail below (*cf.* 2.2.2.1; 2.2.2.2).

2.2.2.1 Cognitive strategies

A cognitive strategy or style is a **procedure** or **group of procedures** that learners use to perform **academic** tasks. Cognitive strategies involve higher order thinking skills and entail complex processes for problem-solving, decision-making and conceptualising of information (Epstein, 2008:40; Meltzer *et al.*, 2007:165; Lerner, 2006:103,188; Robson, 2006:70, 80-83; Kozulin *et al.*, 2003:3; Rivken, 2002:37; Paour & Cèbe, 1999:281). Epstein (2008:40), Lerner (2006:103,188), Rivken (2002:37) and Paour and Cèbe 1999:281) concur that cognitive strategies or styles differ from **ability** in that ability is an issue of **capacity**, while **cognitive strategy** is a matter of **habit**. Cognitive strategies and styles reflect individual differences in organising or processing information required to do a variety of tasks (Epstein, 2008:40; Lerner, 2006:103,188; Rivken, 2002:37, Paour & Cebe, 1999:281).

According to Eggen and Kauchak (2010:219), Brewer (2007:4), Robson (2006:84-85) and Botha (2003:276), by the age of four, children begin to use strategies in solving problems. This continues to develop with age and young learners should be made aware of their own thinking. The child shows advanced understanding of factors influencing the execution of cognitive tasks.

2.2.2.2 Cognitive skills

Brewer (2007:29), Nieman and Pienaar (2006:78-79), Robson (2006:9) and Van Staden (2005:50) explain the cognitive skills of an individual also as mental activities that include categorisation, classification, comparison and inferential thinking (*cf.* Table 2.1).

Because the ability to gain knowledge and learning interrelates to the mastery of basic cognitive skills, a young learner needs to **master the basic concepts** needed for decoding and comprehension in order to learn successfully (*cf.* Photo 6.2.1 – 6.2.3) (De Witt, 2009:182; Hansen, 2009:11).

The cognitive and meta-cognitive skills and strategies expected of a Grade R-learner according to the National Curriculum Statement of South Africa (Department of Education, 2002:1) link well with the skills that were addressed in the Children's Inferential Thinking Modifiability Test (CITM) (Tzuriel, 1990:2-

11) utilised in the study, and include the skills and strategies listed in Table 2.1.

Table 2.1: Cognitive and meta-cognitive skills and strategies expected of a Grade R learner

National Curriculum Statement	CITM
☺ Paying attention	☺ Concentration
☺ Remembering	☺ Storing of information
☺ Interpreting	☺ Inferential thinking
☺ Classifying and categorising	☺ Considering different aspects of the data, rules of elimination, negation, search for objects
☺ Comparison	☺ Eliminating clues, comparative ability, simultaneous consideration, negation
☺ Analysing	☺ Gathering information systematically
☺ Problem-solving	☺ Solving inferential problems
☺ Evaluating	☺ Reflection, coping with complex presentation of information
☺ Inferring principles and deducing rules	☺ Inferential thinking, transfer
☺ Imagining possibilities	☺ Transfer of strategies and rules
☺ Generating strategies	☺ Rules of elimination and negation, transfer of strategies and rules
☺ Critical evaluation and reflection	☺ Improving general efficiency of performance

For the purpose of this study, I focused on an **interrelated application** of all the above-mentioned cognitive and meta-cognitive skills and strategies. An analysis of the cognitive and meta-cognitive skills and strategies presented in Table 2.1, indicates that learners need to acquire lower and higher order thinking skills and strategies. These skills and strategies correspond well with the old and revised taxonomy of educational objectives according to Bloom (in Awudetsey, Grosser, Karstens, Lombard & Meyer, 2010:63-68; Byram & Dube, 2008:14-19; Bloom, Englehart, Furst, Hill & Kratwohl, 1956:56), as reflected in Table 2.2 .

Table 2.2: Bloom's revised and old taxonomy of educational objectives (new taxonomy is indicated in bold print)

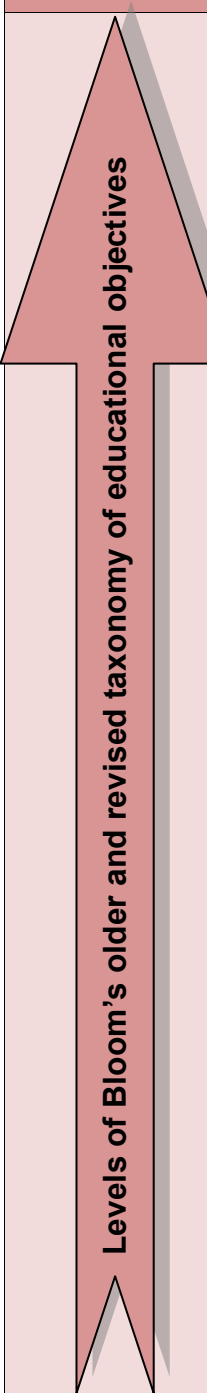
Bloom's revised (and old) taxonomy of educational objectives	
	6. Creating (Synthesis) Creating new ideas, products, or ways of viewing things. Designing, constructing, planning, producing, inventing.
	Skills
	<ul style="list-style-type: none"> ✓ Use old ideas to create new ones; ✓ generalise from given facts; ✓ relate knowledge from several areas; and ✓ predict, draw conclusions.
	5. Evaluating (Evaluation) Justifying a decision or course of action. Checking, hypothesising, critiquing, experimenting, judging.
	Skills
	<ul style="list-style-type: none"> ✓ Compare and discriminate between ideas; ✓ assess values of theories, presentations; ✓ make choices based on reasoned argument; ✓ verify value of evidence; and ✓ recognise subjectivity.
	4. Analysing (Analysis) Breaking information into parts to explore understandings and relationships. Comparing, organising, deconstructing, interrogating, finding.
	Skills
	<ul style="list-style-type: none"> ✓ See pattern; ✓ organisation of parts; ✓ recognition of hidden meanings; and ✓ identification of components.
	3. Applying (Application) Using information in another familiar situation. Implementing, carrying out, using, executing.
Skills	
<ul style="list-style-type: none"> ✓ Use information; ✓ use methods, concepts, theories in new situations; and ✓ solve problems using required skills or knowledge. 	
2. Understanding (Comprehension) Explaining ideas or concepts. Interpreting, summarising, paraphrasing, classifying, explaining.	
Skills	
<ul style="list-style-type: none"> ✓ Understanding information; ✓ grasping meaning; ✓ translating knowledge into new context; ✓ interpreting facts, comparing, contrasting; ✓ ordering, grouping, inferring causes; and ✓ predicting consequences. 	
1. Remembering (Knowledge) Recalling information. Recognising, listing, describing, retrieving, naming, finding.	
Skills	
<ul style="list-style-type: none"> ✓ Observation and recall of information; ✓ knowledge of dates, events, places; ✓ knowledge of major ideas; and ✓ mastery of subject matter 	

Table 2.2 indicates that the lower order skills refer to remembering and understanding and the higher order skills comprise application of knowledge, analysing information, evaluating information and synthesising information.

I also acknowledged the importance of cognitive functions and non-intellective factors for effective cognitive development. These aspects are addressed in sections 2.4 and 2.7.5, respectively.

As this study focused on the cognitive development of Grade R-learners, I had to gain a thorough understanding of how the cognitive development of these learners takes place in order to pitch my intervention at the correct difficulty level and to structure activities in accordance with what can be expected of a Grade R learner.

2.3 COGNITIVE DEVELOPMENT OF THE GRADE R-LEARNER

Donald *et al.* (2010:58), Brewer (2007:29), Donald *et al.* (2006:20), Nieman & Pienaar (2006:78-79), Van Staden (2005:50) and Louw *et al.* (2004:10) define cognitive development as processes in the brain entailing intellectual activities such as perceiving, thinking, problem-solving, understanding and remembering.

For the successful execution of thinking activities Grade R learners require well-developed cognitive and meta-cognitive skills and strategies, and should therefore be provided with opportunities to develop their thinking skills as illustrated in Figure 2.2 (Bolani *et al.*, 2007:11).

Figure 2.2: Opportunities to ensure cognitive development in Grade R

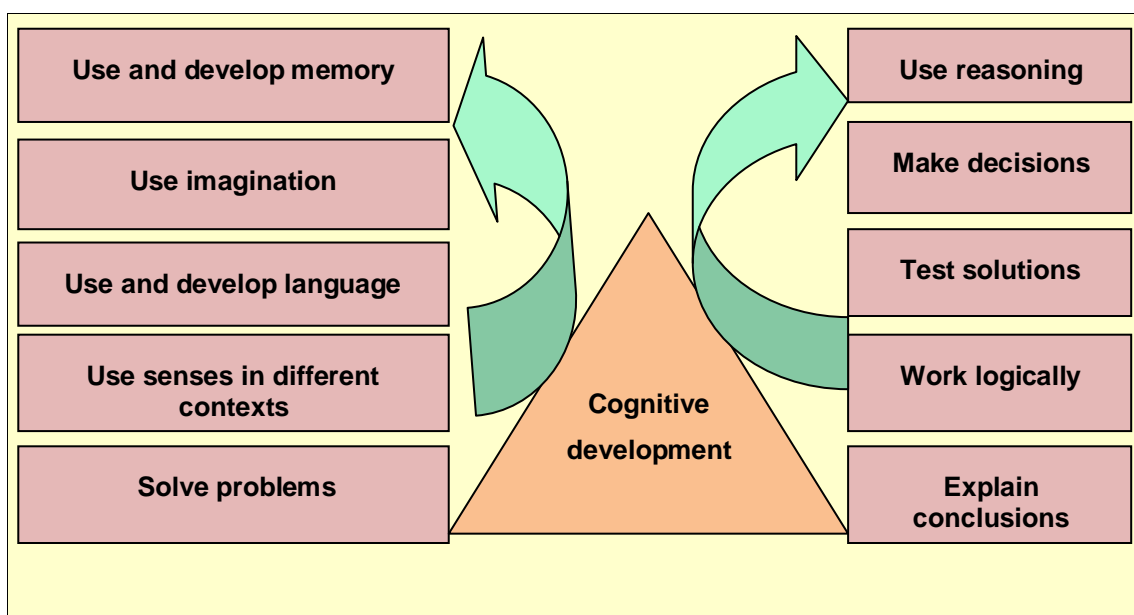


Figure 2.2 indicates that educators should be equipped to design and create developmental appropriate learning experiences in order to optimise and develop cognitive skills. These experiences should include activities where learners can use and develop their memory, imagination, language skills and problem-solving skills by means of their senses. Learners should also be encouraged to reason, make decisions, test their solutions, explain their conclusions and work logically and orderly (Brewer, 2007:29; Bolani *et al.*, 2007:11; Nieman & Pienaar, 2006:78,79; Van Staden, 2005:50; Louw *et al.*, 2004:10).

Van Staden (2005:50-51) and Paour and Cèbe (1999:143) are of the opinion that the Grade R-learner's cognitive development should include, among others, two important aspects, namely **knowledge** and **memory** (Van Staden, 2005:50-51; Paour & Cèbe, 1999:143). Knowledge refers to content and the information that a learner collects through facts and concepts. The learner should then be able to utilise various cognitive and meta-cognitive skills and strategies in order to understand and use the information gained. This knowledge creates a framework for understanding new ideas. It is important that learners should be able to link knowledge to existing understanding in order to ease the process of remembering (Bolani *et al.*, 2007:11; Van Staden 2005:50-51; Paour & Cèbe, 1999:281).

Memory is recognised as an **intellectual process**, which involves all **learning**, and more specifically **retaining of information** (Papalia *et al.*, 2008:280; Van Staden, 2005:51). The question can be asked: Why do some early memories last longer than others do? One aspect can be the **uniqueness** of the event and another is children's **active participation**, either in the event itself or in its retelling. Pre-schoolers tend to remember things they **did** better than things they **saw** (Papalia *et al.*, 2008:280; Brewer, 2007: 4-5; Van Staden 2005:50), and Grade R-learners should therefore be allowed to experience content concretely and physically in order to remember (Papalia *et al.*, 2008:280; Brewer, 2007:4-5; Van Staden, 2005:51). Linked to the aforementioned, Epstein (2008:40), Wegerif (2006:2), Van Staden (2005:51) and Rivken (2002:37), argue that learning in Grade R should therefore evolve around real experiences and discovery and include making observations; making connections (interpretation); association; planning; communicating their discoveries; and reflecting on those discoveries along with those of their peers.

Young learners need opportunities to learn actively in ways suitable to their individual techniques for organising and remembering information in an *easy-to-learn* format (Eggen & Kauchak, 2010:30; Brewer, 2007:33). Tasks should not be too difficult or too easy, but developmentally appropriate with enough challenges to stimulate creative and critical thinking.

Cognitive skills in children in the age group five to six years are especially dependant on the information they receive through their senses (Brewer, 2007:29; Nieman & Pienaar, 2006:78-79; Robson, 2006:9; Van Staden, 2005:50), and therefore active interaction during learning experiences is so important in the pre-school years.

A synthesis of the reviewed literature thus indicates that the cognitive development of the Grade R learner involves the development of knowledge and memory by means of active and sensory learning. Furthermore, these learners also have to apply the knowledge that they gain. For this purpose, they need to acquire cognitive and meta-cognitive skills and strategies such as reasoning, decision-making, problem-solving, categorizing, evaluating, reflecting and creating. In the context of the study, the acquisition of the

applicable cognitive and meta-cognitive skills and strategies were infused into the subject knowledge that was dealt with during the completion of learning activities.

In order to design appropriate activities for my intervention programme that would optimise cognitive development among Grade R-learners, I had to take cognizance of the key activities that play a role in the execution of cognitive functions among Grade R-learners.

2.3.1 Key elements that play a role in the execution of cognitive functions in Grade R

A summary of the key activities that play a role in the execution of cognitive functions in Grade R, links well with Piaget's characteristics of cognitive development in the pre-operational phase, and includes children in the age group two to seven years (*cf.* 2.6.2.1). I had to take cognizance of the following elements in order to make sure that they were incorporated in the learning activities of my intervention programme (*cf.* 6.4).

2.3.1.1 Symbolic thought

Symbolic thought of children four to five years old can be observed through their representational drawings, written symbols (only some children), names (only some children) and numbers. They will also be able to interpret graphs with the assistance of the educator. By means of **deferred imitation** young learners can make an object such as a doll to represent or symbolise something else, such as a person. This is why pretend play, fantasy, play, dramatic play or imaginary play is so important in the pre-school years. (Papalia *et al.*, 2008:269,270; Van Staden, 2005:53, 54).

2.3.1.2 Cause and effect

Piaget (*cf.* 2.6.2.1), Eggen and Kauchak (2010:42-43) and Papalia *et al.* (2008:269) believe that the pre-school learner cannot yet reason logically about **cause and effect**. In contrast to this argument, current research however proves that children between two-and-a-half and five years old can demonstrate flexible causal reasoning appropriate to a subject. Their explanations range from physical (I have to clean the scissors so that I can cut better) to social-conventional (I have to stop now, because you said so). Pre-

schoolers believe causal relationships to be completely predictable and that events have causes (Eggen & Kauchak, 2010:42-43; Papalia *et al.*, 2008:269,270).

2.3.1.3 Classification and categorisation

The young learner can organise objects, people and events into meaningful categories. By four to five years of age most of the young learners can **classify** items based on one attribute only, for example size, colour, **or** shape. In other words, they are able to identify similarities and differences (Eggen & Kauchak, 2010:40; Papalia *et al.*, 2008:269,270; Van Staden, 2005:53.54). Young learners aged six to eight years can classify objects based on multiple attributes. They are also able to understand that objects can belong to several classes at the same time, for example, shape, colour and size (Eggen & Kauchak, 2010:40; Papalia *et al.*, 2008:269,270; Van Staden, 2005:53.54).

2.3.1.4 Problem-solving

Eggen and Kauchak (2010:38), Papalia *et al.* (2008:273,274,353), Patterson (2008:287) and Van Staden (2005:53,54) concur that by the age of three to six years, most young learners will be able to spontaneously **solve** everyday **problems** by trial and error or by using formulae and rules. By the age of six years and older, young learners will let the facilitator know that they need more information in order to solve a problem. With the support of the educator, children of five years and older will be able to make use of meta-cognitive skills, such as thinking about the problem, asking clarifying questions, planning a solution and reflecting on learning and errors (Eggen & Kauchak, 2010:38; Papalia *et al.*, 2008:273,274,353; Patterson 2008:287; Van Staden, 2005:53,54).

2.3.1.5 Conservation

According to Eggen and Kauchak (2010:38); Papalia *et al.* (2008:273,274,353), Patterson (2008:287) and Van Staden, (2005:53, 54), most children from two to seven years of age are not able to **conserve**; for example they will declare that a group is bigger or longer when rearranged. Recent research advocates that children in this age group are able to conserve number if four or fewer objects are used, but they will not be able to

explain their answers. This implies that from six to eight years of age, most children can conserve number, length, liquid and mass. They will justify their answers by stating that although the groups look different, they are the same (*cf.* 6.4.4.8; Photo 6.9.1 – 6.9.2).

2.3.1.6 Basic concepts

Most children in the age group four to five years know the difference between **basic concepts** such as big/small, big/little, tall/short, high/low, thick/thin, outside/inside. Some of them will know concepts such as full/empty, light/heavy, top/bottom, middle, first, second, third, rectangle, triangle, circle, line, etc. However, they still find it difficult to recognise underneath, below, over and under (*cf.* 6.4.4.9; Photo 6.10.1 – 6.10.2) (Van Staden, 2005:53, 54).

2.3.1.7 Number concept

By four to five years of age, most children know the **names of colours** and are able to do **one to one correspondence**. They are able to count and deal with quantities. By the age of five to six, they are able to rote **count** up to 20 and start counting onwards from any number other than 1, for example starting from 5 and counting onwards up to 10. They are able to recognise and write numbers from 1 to 10 and can use rules and scales. By the age of six to seven they have a discerning grasp of numbers, for example, knowing stable order and cardinality principles, discriminating and coordinating quantities, making numerical magnitude comparisons, doing simple addition and subtraction, calculating in story problems and non-verbal contexts, calculating abstractly (in the “head”), estimating sizes and numbers, copying number patterns (*cf.* 6.4.4.10; Photo 6.11.1 – 6.11.3), extending number patterns and differentiating numerical relationships (*cf.* 6.4.4.10; Photo 6.11.1) (Papalia *et al.*, 2008:269).

2.3.1.8 Scientific concept

Papalia *et al.* (2008:269) and Van Staden (2005:54) state that most five to six year old children know simple **scientific concepts** based on their world of experience, for example people, animals, plants, seasons and the weather. They also understand their own position in space compared to other things or persons near them and express words regarding spatial relationships (*cf.*

6.4.4.11; Photo 6.12.1 – 6.12.2). By four to five, most children understand the concepts before and after, yesterday and tomorrow and are able to tell the sequence in a story.

According to Piaget, young learners are **egocentric**, because they focus on their own point of view and cannot regard another person's point of view. Therefore young learners sometimes experience difficulty separating reality from what goes on inside their heads and why they are confused by it. Later research concluded that young learners could look upon another person's point of view if the task calls for thinking in a familiar, less abstract way. Thus, young learners may show egocentrism primarily if the situation is beyond their immediate experience (Papalia *et al.*, 2008:273).

2.3.1.9 Memory

With regard to **memory** development, young learners progress in attention, speed and competency with which they process information. Memory consists of three processes, namely **encoding**, **storage** and **retrieval** (Papalia *et al.*, 2008:279). These three phases can be compared to a filing system. During the **encoding** phase, information is put into a “folder” and labelled or coded for easier recovering when needed. During the **storage** phase, this information “folder” is put away in the “filing cabinet”. When the information is needed, **retrieval** occurs when the learner searches for the “file” and takes it out (Papalia *et al.*, 2008:278; Patterson, 2008:292-294). **Recognition** and **recall** are two types of retrieval. **Recognition** is the ability to remember previous experiences, while **recall** is the ability to replicate knowledge from memory. According to Papalia *et al.* (2008:279) pre-schoolers perform better on recognition than on recall, although both abilities improve with age. The more familiar young learners are with objects or information, the better they will recall them. **Motivation** and the use of **strategies** play a significant role in optimising recall (*cf.* 6.4.4.12; Appendix 5: Session 12; Photo 6.13.1 – 6.13.2). Young learners tend to fail in utilising strategies for remembering, even though they know the strategies. They still need to be reminded to employ strategies, which may be caused by their lack of awareness of how strategies can be useful (*cf.* 6.4.4.13) (Papalia *et al.*, 2008:279).

2.3.1.10 Self-reflection and meta-cognition

The ability to develop self-regulatory functions is affected by **innate factors** (temperament) and **environmental factors** (interactions with others) (Robson, 2006:85). The development of self-reflection skills was one of the focus points of the **CEPP** intervention (*cf.* 6.4.4.13; Appendix 5).

2.3.1.11 Language

According to Papalia *et al.* (2008:283,284) and Patterson (2008:304) children at the age of three generate short and simple sentences and often omit words. Their sentences are **declarative** of nature (“I want milk”) and they can ask and answer **what** and **where** questions. “**Why**” and “**how**” questions are difficult to comprehend. Between four to five years the young learner’s sentences consist of four to five words and may be **declarative**, negative (“I’m not hungry”), **interrogative** (“Why can’t I play outside?”) or **imperative** (“Catch the ball!”). These young learners are able to use complex, multi-clause sentences, such as “I am going to sleep, because I am tired”. They are also able to link sentences to create long stories by utilising words such as “and then... and then...”. The four- to five-year olds can execute instructions that consist of more than one step, for example, “Pick up your shoes and put them in the closet”.

By the age of five to six young learners have an **expressive** (speaking) vocabulary of 2 600 words and understand more than 20 000 words. They produce sentences of five to six words, define objects by their use (I play with a ball) and can tell what objects are made of. They know **spatial relations**, such as “on top”, “behind”, “far”, “near”, “left”, “right” and should be able to know their own address. They should also be able to know **common opposites**, such as “big – small” and understand the concepts of “same” and “different”. These learners should be able to **count** ten objects with understanding and **ask questions** in order to gain information (Papalia *et al.*, 2008:283-284; Patterson, 2008:304).

Papalia *et al.* (2008:284) and Lerner (2006:359-360) explain that although five- to seven-year old learners perform longer and more complicated sentences, they still often make mistakes regarding applying of rules.

Training (mediation), however, can help young learners to master syntactical forms - once again, this is proof of the importance of mediation when working with young children (*cf.* 3.3).

Delayed language development may be caused by hearing problems, head and facial abnormalities, premature birth, family history, heredity, socio-economic factors and some developmental delays. If these delays are not alleviated and rectified in time, far-reaching cognitive, social and emotional consequences will occur (Papalia *et al.*, 2008:287; Patterson, 2008:297, 310-311).

In order to obtain clarity on potential problems learners can experience regarding their cognitive development, I examined the nature of deficient cognitive functions and the role of cognitive functions in cognitive development.

2.4 PROBLEMS RELATED TO COGNITIVE FUNCTIONS

According to Feuerstein (Feuerstein *et al.*, 2010:71-82; Feuerstein *et al.*, 2007:18) cognitive functions play an important role in cognitive development of all learners and are executed during the **Input Phase**, the **Elaboration Phase** and the **Output Phase** of the learning process describe how sensory input is perceived, transformed, reduced, elaborated, stored, retrieved and used. It should be kept in mind that these processes are highly interactive and problems in the Input phase may lead to difficulties in the Elaboration and Output Phases as well. Problems that could be experienced in each of the phases are briefly outlined below.

2.4.1 Input Phase

During the **Input Phase**, the focus is on how a person gathers information. Learners should approach tasks in a planned, systematic and exploratory way, while revealing strategic behaviour in solving problems. They should also possess the verbal tools and vocabulary to process information and be able to follow directions and instructions. Learners should work with precision and own the ability of inferential (if-then) thinking, while simultaneously relating to and considering several sources of information (Feuerstein *et al.*,

2010:71-73; Benjamin, 2009; Feuerstein *et al.*, 2007:23, 24; Tzuriel, 2001:50–55; 72-73).

Problematic cognitive functions impacting on the **Input Phase** comprise deficiencies regarding the quantity and quality of data collected by the individual when confronted with a specific problem, object or experience (Feuerstein *et al.*, 2010:71-73; Benjamin, 2009; Feuerstein *et al.*, 2007:23, 24; Tzuriel, 2001:50 – 55; 72-73). If it happens that learners experience deficient cognitive functions in the Input Phase, they will demonstrate extensive and vague perception. They will reveal unplanned, unsystematic and impulsive exploratory behaviour, will not have receptive verbal tools, which cause poor discrimination between objects and establishing relationships between events, and have difficulties with labelling. The learners will have trouble with spatial orientation, temporal concepts and conservation of constancies (size, shape, quantity, orientation). They will not develop a need for precision and accuracy, nor the ability to consider two or more sources of information at the same time (Feuerstein *et al.*, 2010:71-73; Benjamin, 2009; Feuerstein *et al.*, 2007:23, 24; Tzuriel, 2001:50 – 55; 72-73).

According to Mearig (in Feuerstein *et al.*, 2010:272-273) special attention should be paid to the following when working with young children: increasing attention, enhancing ability to focus despite distractions and to shift attention from one stimulus to another. Furthermore, it is important to increase the verbal units absorbed and comprehended by a learner and to grow independence.

2.4.2 Elaboration Phase

In the **Elaboration Phase**, the learner processes all information received during the Input Phase. In other words, the learner should be able to identify a starting point and compare various options, identify a problem and explain his solutions by means of hypothetical thinking and apply what he has assimilated from prior learning. Learners should not reveal impulsive behaviour and should demonstrate good short-term and long-term memory (Feuerstein *et al.*, 2010:76-81; Benjamin, 2009; Feuerstein *et al.*, 2007:23, 24; Tzuriel, 2001:50–55; 72-73).

According to Feuerstein *et al.* (2010:76-80), Benjamin (2009), Feuerstein *et al.* (2007:5) and Tzuriel, 2001:50–55; 72-73) learners who encounter difficulties in the **Elaboration Phase** will not be able to utilise available data and existing cues. They will not be able to perceive and define a problem, or select relevant cues. The learners will lack spontaneous comparative behaviour, the need for practising logical evidence, inferential-hypothetical thinking, strategies for hypothesis testing, problem-solving behaviour and planning behaviour. Unfortunately, learners who have trouble in the **Elaboration Phase** will have deficient verbal potential, which will restrain them from expressing their thoughts. This will impact negatively on cognitive functioning in the **Output Phase**.

Mearig (in Feuerstein *et al.*, 2010:272-273) highlights the following as important when working with young learners: enhancing the ability to sequence events in logical progression, sequencing steps in problem-solving, nurturing transcendence from dependent and concrete learning to independent, abstract learning, improving the manipulation of symbols and words and increasing the ability to describe concepts and words.

2.4.3 Output Phase

During the **Output Phase** aspects such as egocentric communication, blocking behaviour, visual transport, and transfer principle can play a decisive role in the thinking processes of a learner (Feuerstein *et al.*, 2010:74-75; Benjamin, 2009; Feuerstein *et al.*, 2007:23, 24; Tzuriel, 2001:50 – 55; 72-73).

Impediments in the **Output Phase** involve inadequate communication of final solutions, such as egocentric communicational modalities, difficulty in projecting virtual relationships, blocking behaviour, trial and error responses, inadequately communicating responses, deficient visual transport and impulsive and acting-out behaviour (Feuerstein *et al.*, 2010:74-75; Benjamin, 2009; Feuerstein *et al.*, 2007:23, 24; Tzuriel, 2001:50 – 55; 72-73). Mearig (in Feuerstein *et al.*, 2010:272-273) argues that special attention should be paid to enhancing precise and accurate responses in the Output Phase, when focusing on the cognitive development of young learners.

Dealing with the development of cognitive functions is a complex task, as it is quite difficult to decide whether the cognitive functions are developed or not. According to Feuerstein *et al.* (2010:271-272) cognitive functions can:

- not yet be developed;
- be developed but not manifesting themselves in an observable way;
- be developed but some deficiency or inadequacy in their application exists;
- be developed but lack practice and are therefore fragile and not applied properly; or
- appear inappropriate in some tasks but not in others.

In the context of the study, the cognitive functions as conceptualized by Benjamin (2009) guided the observations (*cf.* Appendix 7), and the assessment of the nature and quality of the cognitive functions was guided by the aforementioned classification of Feuerstein *et al.* (2010:271-272).

It was important to establish the nature and place of cognitive education in the present South African teaching and learning scenario in order to identify and justify the relevance of my study in the present teaching and learning context.

2.5 THE IMPORTANCE OF COGNITIVE DEVELOPMENT IN THE SOUTH AFRICAN SCHOOL CURRICULUM

The fundamental pedagogic philosophy in the previous South African school system followed a **positivistic traditional scientific method** of teaching (Donald *et al.*, 2006:82). This drill and repetition approach promoted rote learning with little understanding on the part of the learners. This approach was based on the principle that the educator possessed all the knowledge (Grosser & De Waal, 2008:41; Bolani *et al.*, 2007:v; Donald *et al.*, 2006:82; Benjamin, 2005:4). The autocratic philosophy held the belief that the educator was the transmitter of information and the only responsibility the learner had, was to remember all the facts (Grosser & De Waal, 2008:41; Bolani *et al.*, 2007:v; Donald *et al.*, 2006:82; Benjamin, 2005:4). This philosophy impacted not only on the **learners**, who did not learn to make meaningful connections between what was learned in the classroom and the real world, but also on

the **educators' thinking** and **classroom** practices. The knowing adult, leading the child to maturity, resulted in an **authoritarian disposition** where teaching was about transmission of information and learning about retention of facts (Benjamin, 2005:4; Taylor & Vinjevold, 1999:21). Donald *et al.* and Freire (in Donald *et al.*, 2006:82) refer to this direct instruction as “*students who are empty vessels that need to be filled up with knowledge from the educators*”, the “*banking approach to education*” and “*talk and chalk teaching*”.

Since 1994 educationalists have been attempting to address the **educational imbalances** of the past by providing policy and legislative frameworks regarding equity, redress, quality, efficiency and the right of all learners to **equal educational access** and **opportunities** (Benjamin, 2005:4). Therefore the movement is to a learner-centred, constructivist approach (*cf.* 2.6.2), which will provide educators with the conceptual tools to work in diverse learning contexts and where every learner receives opportunities to demonstrate his abilities (Wes-Kaap Onderwysdepartement, 2006:4).

In order to develop each learner to his full potential and to create compassionate, multi-skilled, numerate, literate, independent, confident and life-long learners who can participate in society as critical, flexible and active thinkers (Grosser, 2006; Department of Education, 2002:1), it is crucial that educators should have ample knowledge of the various learning theories (theoretical perspectives) concerning child development, as will be dealt with in the following section. Therefore, the shift in the South African Education system to focus more strongly on cognitive development due to the following critical outcomes, which distinctly address cognitive development which is addressed in the critical outcomes of the National Curriculum Statement (Department of Education, 2002:5):

- identify and solve problems and make decisions using critical and creative thinking;
- collect, analyse, organise and critically evaluate information;
- demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.

Because of the fact that, during the early years, young learners develop an outlook and attitude toward education and themselves that will stay with them all their lives, education in South Africa needs to keep step with what is relevant and necessary in today's life (Kostelnik *et al.*, 2007:4). Current education emphasises a balance between **the transmission of facts** and the **process of thinking**. The current goal is to have learners who possess knowledge and can think for themselves. Many educators believe that critical thinking is a prerequisite to education. Learners should be taught to **monitor** their thinking, as well as **critically assess** the thinking of others. In a learning environment where questioning becomes a way of reflection, learners will be encouraged to question the validity of sources of information, including educators (Sezer, s.a.:350). It is clear from the preceding discussion that **application of knowledge** and **self-reflection** appear to be two important outcomes of teaching and learning which will only be achieved when learners' cognitive capacities are adequately developed. In this regard, my study that focuses on cognitive development is very relevant in the South African education scenario.

I argue that in order to establish a strong cognitive focus in education, educators should strive to encourage learners to be actively engaged in a variety of activities and have frequent, positive interactions with the educators. **Active learning** ensures **active learners** who attend to instruction, assign results to their own efforts, relate tasks and materials to their knowledge and experience and actively construct meaning during learning. Educators should ask open-ended questions and broaden learner's performance and verbalisation with multi-faceted ideas or materials, interact with learners individually, positively guide learners and encourage independence. Learners should thus be taught strategies that focus on **how** they learn instead of on **what** they learn (De Witt, 2007:2; Lerner, 2006:106, 117, 185; Hendrick, 2004:379-384; Love, Schochet & Meckstroth, 1996:5).

In order to establish educational excellence for all and improve the pass rate in South African schools and tertiary institutions, learners' cognitive development should be optimised. South Africa needs a curriculum with a strong cognitive focus that adequately prepares learners for the present reality

and the future to become successful, constructive citizens (Kramer, 2007:2; Department of Education, 2002:4).

Adams (2010b:152-164), Eggen and Kauchak (2010:11), Patterson (2008:24-25), Meintjes (2007:153) and Lerner (2006:185) argue that cognitive education assists a learner in slowing the process of forgetting and helps to **transfer** information to long-term memory. In order to remember, cognitive education teaches a learner to **group** and **organise** information by relating it to other areas of knowledge; for example, animals can be organised in basic groups such as wild animals, farm animals and pets. Another method to promote cognitive education is to teach learners to **utilise key words** (or pictures) in order to remember information, e.g. will remind the young learner to stop and listen carefully before commencing with an activity. Teaching the learner to use **prior knowledge** in order to make information meaningful is another advantage of cognitive education. The learner, for example, knows the concept “animal”, links it with “dog” and expands this understanding by identifying a small silver and tan dog as a Yorkshire terrier.

By making use of **meta-cognitive** strategies, learners will become **efficient** in their learning (Eggen & Kauchak, 2010:12; Patterson, 2008:24-25; Lerner, 2006:178-185). Strategies such as **classification** will assist the learner to determine the type, status or mode of a learning activity. **Focusing** (checking) involves taking steps during the process of problem-solving to determine progress, success and results. **Reflection** (evaluation) goes beyond focusing and provides information regarding quality, while **transferring** (prediction) provides information about the possible alternative options and applications for problem-solving and possible outcomes.

As my research envisaged creating a learning environment conducive to cognitive development in my programme, I had to examine various theoretical perspectives on how learning takes place to enable me to create a learning environment in the development of my intervention programme that would optimise cognitive development.

2.6 ENHANCING COGNITIVE DEVELOPMENT: THEORETICAL PERSPECTIVES

Several theoretical points of view describe children's learning and development. According to Patterson (2008:19-28; 285; 292; 299) and Brewer (2007:5-6) **learning** implies the gaining and memorising of information, which is called **content knowledge**, and also the gaining of thinking ways and doing, which is called **procedural knowledge**.

In order to locate the development of my intervention programme within a theoretical framework for learning and teaching, I discuss some of the major learning theories that inform classroom teaching and learning, namely **Behaviourism, Cognitivism and Constructivism**, and link them to my study in terms of their merits in relation to **cognitive development**.

2.6.1 Behaviourism

The behaviourist theory is an **objectivist theory**, which advocates that behaviour can be formed by the response that follows a particular action. Behaviourists such as **John B Watson** (1878-1958), **Edward Thorndike** (1874-1949) and **B.V. Skinner** (1904-1990) believed that children acquire knowledge through repeated interactions with the environment (Eggen & Kauchak, 2010:189; Lerner & Johns, 2009:160-164; Hughes, 2008:62; Patterson, 2008:20; Brewer, 2007:6, 57; Donald *et al.*, 2006:104; Troutman & Lichtenberg, 2003:13,14; Meyer, Moore & Viljoen, 2003:248,251). Furthermore, the consequences of these interactions (positive or negative) will determine whether the interaction will be repeated or avoided. When practising the behaviourist model, the learning process is directed by the **adult** who controls the sequence of stimuli as well as the reward and punishment system (Eggen & Kauchak, 2010:189; Lerner & Johns, 2009:160-164; Hughes, 2008:62; Patterson, 2008:20; Brewer, 2007:6, 57; Donald *et al.*, 2006:104; Troutman & Lichtenberg, 2003:13-14; Meyer *et al.*, 2003:248, 251).

A behaviourist classroom mainly relies on **Direct instruction** (also known as explicit teaching), which entails the transmission of knowledge in a structured and controlled manner (Kramer, 2007:100; Lerner, 2006:104). It is an

educator-centred approach where the educator provides all the knowledge, but also directs what and how learning happens. Educators make use of teaching techniques, such as transmission mode action, including lecturing, dictating, demonstrating, drill exercises and presentations. This is a one-way communication approach where learners are mostly passive receivers of information (Kramer, 2007:100; Lerner, 2006:104). When looking at a behaviourist classroom, one will find passive **learners** who place the responsibility for the selection and pacing of learning on the educator, as was evident in South Africa's previous school system (Robson, 2006:37).

Although **Foundation Phase-learners** (pre-school to Grade 3) thrive in a positive emotional learning environment where hugs and praise are at the order of the day, the behaviourist theory is not ideal to utilise predominantly as classroom practice, because the learners are relatively passive, placing the responsibility for the selecting and pacing of learning on the educator.

According to my understanding of the aforementioned, the behaviourist learning theory considers learning to be an **inductive process** that focuses primarily on **intellectual development**, which is learning of **content** and **facts** by means of direct instruction and does not emphasise the development of **generalised intellectual abilities**. In this regard, Eggen and Kauchak (2010:189), Robson (2006:37) and Derbyshire (2003:400) indicate that the behaviourist theory is more a theory for **learning** than a theory of **thinking**.

As the new South African curriculum emphasises the development of learners' thinking and understanding, I argue that framing teaching and learning solely within a passive, behaviouristic approach will not optimise learners' cognitive development, and that a cognitive perspective as outlined in the following section could be more beneficial to cognitive development.

2.6.2 Cognitivism

The cognitivist revolution replaced behaviourism in the 1960s as the dominant paradigm. Cognitivists such as **Piaget**, **Bruner**, **Ausubel**, and **Feuerstein** shifted the emphasis from the importance of the environment to the significance of the learner as **active processor** of information in his own learning (Lerner, 2006:164-172; Landsberg, Krüger & Nel, 2005:103;

Derbyshire, 2003:410). Cognitivists have a more **holistic** notion than behaviourists, moving from the general to the specific aspects. Cognitive psychologists believe cognitive structures can be **learned** and regard learning as a **deductive process**. Cognitive psychology analyses how people learn and therefore offers strategies for teaching. Teaching strategies based on cognitive psychology can help learners learn to attend, to remember, to understand, to think and to enjoy learning (Lerner & Johns, 2009:177).

Cognitivism focuses on the learner's **inner mental activities** and sees him as an **active processor of information** in order to **understand** what is presented to him. Cognitive abilities are essential to human functioning and enables one to **know**, be **aware**, **think**, **conceptualise**, use **abstractions**, **reason**, **criticise** and be **creative** (Lerner, 2006:173-175; Landsberg *et al.*, 2005:103; Derbyshire, 2003:410). These inner higher order mental activities in the human mind are valuable and necessary for understanding how people learn. Cognitivism focuses on the development of **mental processes** such as thinking, memory, knowing, organising, reflection (self-monitoring, self-questioning, and self-checking), rule learning, decision-making and problem-solving, need to be developed.

A synthesis of the view of Hughes (2008:63), highlight the main tenets of Cognitivism linked to teaching and learning as follows:

- **Prior knowledge:** New knowledge and skills should be linked to learners' existing knowledge and skills. Learning takes place when the learner can add to and alter existing knowledge.
- **Organisation of knowledge:** Learners should be encouraged to organise their learning in order to identify what they hope to gain from doing a certain activity. This can be done through a process of "scaffolding".
- **Working memory:** This is important to ensure learners are not required to learn more than their working memory can cope with at any particular time. Working memory can be explained as that stage where information is temporarily retained before it is stored in long-term memory.
- **Learning as an active process:** Learning is an active process and should be goal directed.

A cognitivist approach to teaching and learning utilises a variety of teaching and learning strategies which include *inter alia* indirect strategies, co-operative strategies and independent strategies that foster cognitive development (Kramer, 2007:99).

Indirect instruction is a learner-centred approach involving the learner in his own learning (Kramer, 2007:100; Lerner, 2006:104). Learners are active participants while the educator acts as a facilitator, managing the learning process. Indirect methods such as discussions, debates, and analysing, researching, exploring, investigating, decision-making and expressing personal concepts are a result of indirect methods. Kramer (2007:100) and Lerner (2006:104) assert that higher order thinking skills are increased and learners encouraged creating their own understanding of concepts. Indirect instruction allows an individual learning style and stimulates the curiosity; creativity and interest of the learners.

Co-operative teaching and learning strategies entail learners working in groups. Co-operative learning can be a valuable tool in the classroom as learners are allowed to work together and help each other to achieve outcomes of the learning task. One of the benefits of co-operative learning is that it teaches learners to function constructively as part of a group and enhances cognitive development through the exchanging of ideas with others and evaluating the ideas of others (Kramer, 2007:103). Other advantages of co-operative or group work are that it develops learners' independence, self-discipline, self-confidence, self-reliance, pride in their own work and persistence. The educator should consider when to utilise co-operative teaching and learning strategy so that it is suitable for the outcomes he/she wants to reach (Kramer, 2007:103).

Mediation underpins the application of **independent learning strategies** and involves the educator to take the role to guide, direct, challenge, support and generally assist learners to master new knowledge and skills (*cf.* 3.2). Reuven Feuerstein developed the theory of Mediated Learning Experience (MLE) more than 40 years ago and it complements Lev Vygostky's theory that mediation assists learners in developing cognitive processes (Greenberg, 2000). According to Feuerstein, mediated learning occurs when an individual

deliberately places him- or herself between external or internal stimuli and the learners and conveys the stimuli to the learners in a specific way. Mediated Learning is discussed in detail in Chapter Three.

The relevance of the cognitive theories and approaches of pioneers such as Piaget, Bruner and Ausubel for the present study will now be briefly outlined. Emphasis will be placed on the theory of Feuerstein as this theory guided the design and implementation of the intervention.

2.6.2.1 Piagetian approach

The Swiss psychologist **Jean Piaget's** view of children as active explorers who construct their own understanding (Byram & Dube, 2008:14-19) played an important role in the implementation of my intervention programme.

Piaget argues that cognitive development is a **continuous process** through which children are ready to execute and understand certain concepts at certain times of their lives. He also believes that children might show evidence of more than one stage simultaneously, but that children cannot proceed to the next stage of their development before they are ready. These stages are referred to as the sensori-motor stage (birth to two years), the pre-operational stage (two to seven years), the concrete operational stage (seven to twelve years) and the formal operational stage (adolescence and onwards) (Awudetsey *et al.*, 2010:63-68; Byram & Dube, 2008:14-19; Berk & Winsler, 2002:99-103)

As the participants who took part in the study could be classified as being in the pre-operational stage according to Piaget's theory, I examined this phase in particular to draw on important aspects that should be acknowledged when dealing with cognitive development of learners in this phase.

Children between two and seven years can work with images and symbols, their thinking, imagination and problem-solving skills develop faster. They develop inner representations of outer reality by representing things mentally or symbolically (Adams, 2010a:35-39; Bagnato, 2007:49; Woolfolk, 2007:30). Children at this stage have trouble in conservation of properties, e.g. if two identical balls of clay are presented to the child, he will agree that the clay balls will have the same amount of clay. If one of the balls of clay is rolled out,

the child will probably believe this ball of clay is bigger than the other one. Their thinking is still very concrete. Although their language develops gradually, they find it difficult to understand other individuals because abstract thinking is not yet fully developed. Another characteristic of children in this stage is that their thinking and behaviour are egocentric because they experience everything from their point of view (Papalia *et al.*, 2008:273).

Although Piaget believes there is little that an adult or another person can do to accelerate children's development (Lerner & Johns, 2009:154-157; Robson, 2006:17), I differ from him, since I believe that the social and emotional environment (family, school, community, society) in which a child is developing also plays a role in optimising cognitive development (Eggen & Kauchak, 2010:45; Papalia *et al.*, 2008:12; Lerner, 2006:17).

In summary, I agree with Piaget that learners should be actively involved in their learning, because active learning provides learners with the opportunity to utilise cognitive skills and strategies to construct their own knowledge. I also support Piaget's view that concrete experiences should be presented first, followed by more abstract and detailed data, especially in the Foundation Phase (Grade R - 3). However, I disagree with him regarding his belief that another human being cannot optimise children's cognitive development. Piaget appears to overlook the important role of interactions with adults and peers during cognitive development.

2.6.2.2 Bruner's discovery learning approach

Jerome Bruner, a developmental psychologist, agrees with Piaget regarding certain stages through which an individual's development grows as he proceeds from infancy to adulthood namely enactive, iconic and symbolic. These stages refer to cognitive development moving through stages from active, concrete learning, to forming mental images and finally abstract learning through language (Byram & Dube, 2008:59-64). Bruner regards **discovery learning** as important for cognitive development (Byram & Dube, 2008:59-64; Meintjes, 2007:177-178; Donald *et al.*, 2006:51-53; Schunk, 1991:298; Linskie, 1977:148-156). This involves *inter alia* formulating and testing hypotheses rather than simply accepting the educator's presentation.

The learners should then be encouraged and motivated to discover the answer or the underlying rules and principles. Bruner argues that a positive classroom atmosphere in which mistakes are regarded as learning opportunities plays an important role in cognitive development (Byram & Dube, 2008:59-64; Meintjes, 2007:178; Schunk, 1991:298).

In line with Piaget's views (*cf.* 2.6.2.1), Bruner argues that a learner should constantly interact with his environment. Bruner's theory of discovery learning theory emphasises learning by doing and intuitive thinking, where learning is an active and unmethodical process and thinking is spontaneous and unplanned. He believes that this can lead to increased confidence and self-dependence, which are important non-intellective factors (*cf.* 2.7.5) for cognitive development (Byram & Dube, 2008:59-64; Meintjes, 2007:179; Schunk, 1991:300). In support of Bruner's theory of **discovery learning** as a prerequisite for cognitive development, my intervention programme provides numerous opportunities for learners to discover (*cf.* Appendix 5).

2.6.2.3 David Ausubel's theory of meaningful reception learning

Ausubel believes that knowledge is **hierarchically organised**, that is, new information is meaningful to the extent that it can be related to existing knowledge and that advance organisers can secure learning. Effective learning can only take place if the learner **understands** what he is learning (Byram & Dube, 2008:64; Meintjes, 2007:180; Schunk, 1991:301-302; Ausubel, 1978:251). This requires extensive **educator-learner interaction**, through which learners are equipped with skills for breaking ideas into smaller, related points, relating new ideas to similar content in memory, linking new knowledge to existing knowledge and giving broad outlines before detailed facts are presented. Learners should be actively involved in learning activities in a systematic and organised manner (Byram & Dube, 2008:64; Meintjes, 2007:180; Schunk, 1991:301-302; Ausubel, 1978:251).

Ausubel distinguishes between meaningful learning and rote learning. **Rote learning** entails memorising of facts and not necessarily understanding what is learned, while **meaningful learning** implies that learners have a deep understanding of what they have learned. Kramer (2007:107-108) argues that

rote learning occurs when educators teach and learners receive, while **meaningful learning** entails guided discovery with the educator and independent discovery where learners do research on their own.

It is clear from the preceding explanation that Ausubel's definition of meaningful learning which involves active involvement and discovery, will be more relevant in a teaching and learning situation where the focus is on cognitive development.

2.6.2.4 Reuven Feuerstein's theory of Structural Cognitive Modifiability (SCM)

Feuerstein's theory acknowledges human beings as **open, adaptive** and **compliant** for change to function better in the environment by means of an active modifying approach called **Mediated Learning** (Feuerstein, 1980:22). The aim of this approach is to **modify** the individual, emphasising **independent** and **self-regulated** change. Feuerstein views intelligence as a **changeable state** rather than a permanent attribute (Anon., 2008b; Fraser, 2006:9; Feuerstein, 1980:22). **Cognition** therefore plays a central role in **human modifiability**. Many emotional and behavioural problems may be modified through cognitive intervention. MLE can diminish the impact of distal factors such as genetic predisposition, organ impairment or educational deprivation (Anon., 2008b; Fraser, 2006:9; Feuerstein, 1980:22).

Falik (2001) explains Feuerstein's MLE (*cf.* 3.6) as a **dynamic interactive relationship** between educator and learner that facilitates cognitive development. Feuerstein believes that human beings can modify themselves by an act of will and can create conditions for self-change (Feuerstein, 1980:22). If problems and deficiencies related to cognitive development can be detected early enough, preventative strategies by means of active and organised intervention can be developed to address the problems and difficulties. Where developmental or environmental difficulties occur, mediation is practised to overcome deficiencies and foster optimised functioning. When a cognitive **deficient learner** is exposed to MLE he can turn into an **independent** and **self-regulating learner** (Anon., 2008b; Falik, 2001; Fraser, 2006:9; Feuerstein, 1980:22).

MLE requires **active interaction** between the individual, the mediator and the objects and events in the environment, which relate to the views of Piaget (cf. 2.6.2.1), Bruner (cf. 2.6.2.2) and Ausubel (2.6.2.3) regarding active educator-learner interaction. This interaction is critical in the process of mediation, focusing on the stimulus world of the young learner as well as understanding and working with his behavioural responses. The objects and events in the young learner's world are vital elements in the mediational process to facilitate change. Through mediation, alternative techniques and strategies can be implemented to overcome deficiencies, optimise development and stimulate high cognitive functioning (Falik, 2006; Fraser, 2006:9; Falik 2001).

Vygotsky and **Feuerstein** regard the role of mediation as vital in the development of especially higher cognitive abilities. This view differs from that of the behaviourist Pavlov who believes that conditioned and unconditioned reflexes occur and the cerebral cortex acts as central station through which conditioned reflexes are relayed (Meintjes, 2007:185; Falik, 2006; Vygotsky, 1978:52-57). Vygotsky views the mediator as an "*operator that plugs in the line and so connects the cortex and the social environment*" (in Meintjes, 2007:185; Vygotsky, 1978:52-57). Aspects such as other human beings, language, culture and artefacts are also considered tools that can mediate an individual's development.

Mediation plays an imperative role in the lives of young children, who are at formative stages in their development and who present adaptability to mediation. This adaptability is a natural part of their developmental readiness and because skills and abilities are in their most emerging and flexible states in young learners (Falik, 2006; Falik, 2001).

Mediation is discussed and explained in detail in Chapter Three.

In summary, what makes the cognitive approach to teaching and learning attractive for cognitive development are that learners are actively involved in the learning process and discover and construct their own understanding of learning content. This leads to learners being able to transfer rules, principles and strategies to new areas of learning.

As my review of the literature on the constructivist approach to teaching and learning revealed advantages for cognitive development, I synthesize my findings of the most important characteristics of Constructivism in the following section.

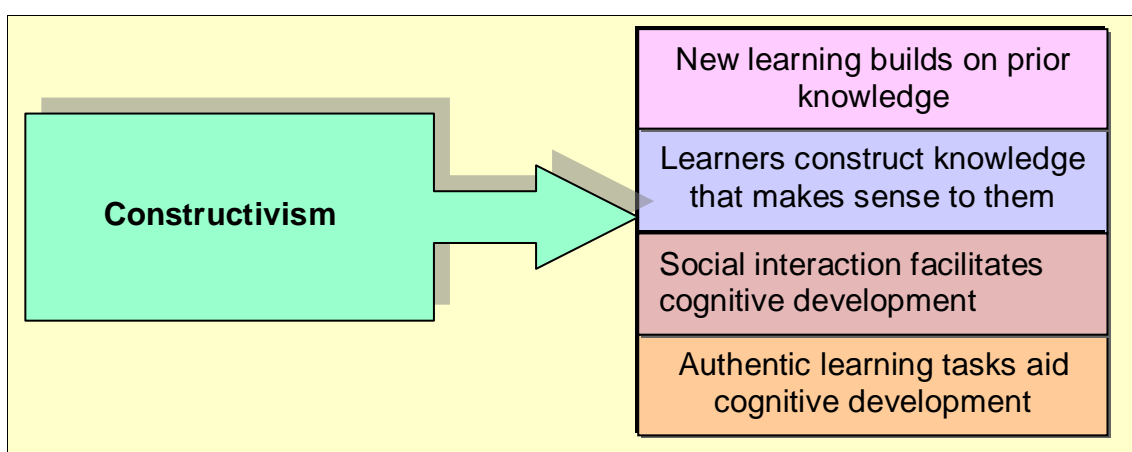
2.6.3 Constructivism

The constructivist theory originates from the work of **Jean Piaget** (*cf.*2.6.2.1) (1896 – 1980) and **Lev Vygotsky** (1896 – 1934). Constructivism is a theory of knowledge (epistemology) which claims that humans construct **knowledge** and **meaning** from their own **experiences**. For Robson (2006:13, 14), Fraser (2006:6) and Troutman and Lichtenberg (2003:14, 15), the constructivist method of instruction recognises the importance of the **learner** in the learning process and believes that learners should build their own understanding of concepts mainly through **self-discovery**. Therefore, knowledge is not obtained passively, but is **actively** and continuously adapted by structuring and re-structuring information and experiences as the learner develops to a higher level of understanding (Donald *et al.*, 2006:51, 82; Troutman & Lichtenberg, 2003:14, 15).

A synthesis of constructivist learning theory reveals that constructivists believe that learning should take place in **realistic** and **authentic** settings, that testing should be **integrated** into the tasks that learners are performing, that knowledge is constructed from **experience**, that conceptual growth occurs from negotiation of **meaning**, sharing of **multiple perspectives** and the changing of **internal representations** through mediation and **shared learning** (Fraser, 2006:7).

In summary, my view of the important characteristics of Constructivism that play a role in cognitive development concur with the viewpoint of Eggen and Kauchak (2010:230) and is summarised in Figure 2.3 below.

Figure 2.3: Characteristics of Constructivism



According to Figure 2.3, I argue that in order to optimize cognitive development, learners should construct their own meaning based on what they already know, they should be **actively involved** in their learning, look for and find solutions themselves in order to acquire understanding. The educator should ensure that he creates learning activities that build on current understanding and a learning environment that will assist learners in constructing meaning instead of absorbing information – therefore the **learner should be at the centre of teaching activities**. The educator should provide guidance and assistance to **help the learner to learn**. The main aim of mediation of learning should be the **construction of knowledge** instead of reproduction of information. Learning should take place in a **realistic environment** where realistic approaches to solve real-life problems are presented. Learners should be given the opportunity to do **self-reflection** (planning, monitoring and evaluating their own work). Constructivists regard learning as a social activity and should therefore involve interaction with other learners (co-operative learning). Constructivism presents four characteristics that influence learning.

Learners should be **critical constructors** of their own knowledge, which will enable them to obtain meaningful understanding, and in turn be provided with opportunities for cognitive development, on the premise that **new knowledge** can only be built on adequate **prior knowledge**. Constructivism also embraces the importance of **social interaction** where learners can learn from

one another, as well as the fact that learners will remember information better if they are involved in **real-life** experiences.

I will now look at two strands of constructivism, namely socio-constructivism and cognitive constructivism, which hold advantages for cognitive development.

2.6.3.1 Socio-Constructivism

Socio-constructivism regards learning to be a **social process** in which learners obtain knowledge by **interacting** with their environment and not only relying on the lectures educators present to them (Fraser, 2006:6). Learners' own experiences enable them to construct significant meaning actively within a particular cultural group. Since every individual's experiences are distinctive and construct meaning in their own unique way, each person's learning is unique. The perspectives of Bandura, Vygotsky and Feuerstein emphasise the role of the social environment and its aspects in learning and cognitive development.

The Canadian, **Albert Bandura**, accentuates the role of **observing** and **modelling** (imitating a person and identify with a model) in human learning, motivation, thought and action (Byram & Dube, 2008:67-68, 149; Meintjes, 2007:124; Bandura, 1986:48-50; Bandura, 1977:12-23; Bandura, 1969:251). Bandura thus believes that all learning phenomena, resulting from direct experience, occur on a vivid basis by observing other people's behaviour and its consequences for them.

Bandura's **Social Cognitive Theory** proposes a theory of human **self-efficacy** that takes a central role to **cognitive, vicarious, self-regulatory** and **self-reflective** processes in human adaptation and change. He regards people as self-organising, pro-active, self-reflecting and self-regulating. According to Bandura (Byram & Dube, 2008:68,149; Meintjes, 2007:183), humans cannot live in isolation; they can give structure, meaning and continuity to their lives and can pro-actively engage in their own development.

Lev Vygotsky, a Russian psychologist, agrees with Piaget that children are actively involved in constructing their understanding of the world. However, he differs with Piaget about how important changes take place. Vygotsky

believes that **language** and the **social** and **cultural** environment in which a child develops are of the utmost importance for cognitive development (Lerner & Johns, 2009:179; Patterson, 2008:25; Brewer, 2007:9; Louw *et al.*, 2004:90, 91; Vygotsky, 1986:13).

Vygotsky's **Socio-cultural Theory** accentuates how knowledgeable members of the culture can assist children in the learning process (De Witt, 2009:55; Patterson, 2008:24,300; Meintjes, 2007:126; Donald *et al.*, 2006:59; Lerner, 2006:189; Louw *et al.*, 2004:90,91; Vygotsky, 1986:13-18). This view is directly in contrast with Piaget's view of children as independent, individual learners. Vygotsky explains his theory by means of a *critical space of potential development* or the **Zone of Proximal Development (ZPD)** as that stage in a child's life where he cannot yet master something and will not be able to perform without *assistance* from an experienced adult. In other words, the difference between the items a learner can answer on his own and the items the learner can answer with help is the child's **ZPD** (Patterson, 2008:301; Papalia, *et al.*, 2008:363, Meintjes, 2007:126; Donald *et al.*, 2006:59; Lerner, 2006:186; Portes & Vadeboncoeur, 2003:385; Vygotsky, 1986:13-18; Vygotsky, 1978:84-91).

Instruction should take place in the **ZPD**, because at this level it is not too hard or too easy to grasp information under adult guidance. Assistance given to a learner can be explained as **scaffolding** (support) where adults provide just enough help to allow the learner to succeed. The scaffolding is gradually withdrawn as the child's skills develop until he is able to carry out important tasks independently.

Vygotsky also believes that play is extremely important in the young learner's development (Brewer, 2007:147-148; Bodrova & Leong, 1996:126; Vygotsky, 1978:102), because in play, the child always behaves beyond his average age or his daily behaviour. He argues that play creates a child's ZPD, since a child can control behaviour, such as attending to a task, before he is able to control that behaviour in other settings. He also believes that play facilitates the separation of thought from actions and objects; because in play the child can pretend that a block is a car. This separation of object from meaning is critical to the development of abstract thinking. Furthermore, Vygotsky claims that

play facilitates the development of self-regulation by matching the role he has accepted, e.g. a child playing “baby” can stop crying or sleep on command, therefore the importance of presenting learning content and activities through play and active involvement on the part of the young learner.

According to Patterson (2008:300), Donald *et al.* (2006:83) and Robson (2006:17), the difference between Piaget’s and Vygotsky’s views of child development is that Piaget regarded the child as actively adapting to his environment “**from the inside out**”, while Vygotsky saw the child as active, but mediated “**from the outside in**”. The differences between Piaget and Vygotsky should not divide those who prefer one perspective to the other. Unique features of both theories should be incorporated to optimise cognitive development in young learners.

2.6.3.2 Cognitive constructivism

In essence, cognitive constructivism focuses mainly on equipping learners with cognitive processes they need to make sense of the world around them with the assistance of a mediator. This approach provides learners with the opportunity to construct their own sense of what is being learned by making connections or relationships among the ideas and facts in the learning material with the help and guidance of a mediator. Cognitive constructivists regard learning as a process of creating new knowledge and not only a process of obtaining information (Fraser, 2006:6).

To be a mediator of learning, the educator should not only **understand** the needs of learners, but should also **accommodate** learner differences, **adapt** teaching strategies, use **medium of instruction** effectively and create a **warm, learner-friendly environment** (*cf.* 3.4).

For Grade R-learners, an integration of the cognitivist theory and the constructivist theory will be more effective than a programme based on the behaviourist theory, since learners in a behaviourist classroom are not **actively involved** in their own learning and become **passive** learners who have **no say** regarding the **selection** and **pacing** of learning. In line with the viewpoints of Eggen and Kauchak (2010:189), Lerner and Johns (2009:160-164), Fraser, (2006:6) and Nieman and Monyai (2006b:xi), I argue that a

joint cognitivist and **constructivist** classroom encourages learners to construct their **own understanding** of learning content and they are therefore able to apply learned principles and strategies to other and new areas of learning.

Based on the preceding discussion of learning theories that underpin classroom teaching and learning, I synthesize the major trends of those theories applicable for optimising cognitive development, which guided the teaching approach to optimise cognitive development that was followed in the context of the study.

2.6.4 The approach to cognitive development utilized in the study

A combined cognitivist and constructivist approach guided the design and implementation of the intervention programme that was utilized in the context of the study. I motivate my stance by arguing that a cognitivist approach to teaching and learning holds the following advantages for cognitive development:

- learners are regarded as **active processors** and discoverers of information;
- the use of indirect and independent teaching strategies build **higher-order thinking**; and
- the role of mediated learning to assist learners in **acquiring cognitive skills** (*cf.* 2.6.2).

In addition to the above, a constructivist approach is also beneficial to cognitive development and my intervention focused on:

- **active learning** through **self-discovery**;
- the **construction of knowledge** in comparison to the reproduction of information;
- teaching learners to **plan, monitor and evaluate** their own work;
- embracing **social interaction** and **sharing of information**;
- acknowledging the role of **scaffolding** learning in order to assist learners to intimately carry out learning tasks **independently**; and

- purposefully focusing on explicitly equipping learners with the **cognitive and meta-cognitive skills** and **strategies, cognitive functions** and **non-intellective factors** necessary to engage in thinking activities (*cf.* 2.2, 2.4, 2.7.5).

Although this study was built on the premise that the educator's instructional practice could be a factor impacting on learners' cognitive development, it has to be acknowledged that there are a myriad of other factors that also impact on cognitive development. These factors will be briefly explored in the section below as some of them were considered in the interpretation of the research findings (*cf.* CD Section 2 Observation profiles). The numerous factors that affect cognitive development highlight one of the complexities of a study that focuses on cognitive development, namely to determine the cause of cognitive difficulties. In addition to this, the causes for problems related to cognitive development, can differ from one learner to another, which necessitates individual attention to learners who experience cognitive deficits.

2.7 FACTORS IMPACTING ON THE COGNITIVE DEVELOPMENT OF LEARNERS

Some influences on the cognitive development of learners originate with **heredity (nature)**, while others stem from the **environment (nurture)** (Papalia *et al.*, 2008:12). In order to understand cognitive development, we should look at **inherited characteristics** unique to each child, as well as the vast amount of **environmental factors** that affect children. Educators should be aware of which developmental traits are maturational and which are due to individual differences, in order to address problems related to cognitive development in a differentiated way.

Schools are no longer the only agent in the education of children. Various aspects may hinder scholastic performance, as discussed below. Research worldwide proves that **educational intervention** for **young children** is **very effective** and has a **high payoff** (Papalia *et al.*, 2008:12-13; Lerner, 2006:17; Lerner, Lowenthal & Egan, 2003:23).

A number of factors that can influence the cognitive development of learners are briefly highlighted below. As this study focused on the important role that

the educators' classroom practice could play in optimising cognitive capacity, emphasis will be placed on the educators' classroom practice as a factor that can influence the cognitive development of the learners.

2.7.1 Cultural neglect and social environment

Papalia *et al.* (2008:15) indicate that culture refers to a society's total way of life, customs, traditions, laws, knowledge, beliefs, values, language and physical products, from tools to artwork, all the behaviour and attitudes that are learned, shared and transferred among members of a social group. Because of contact with other cultures, culture is constantly changing.

According to Feuerstein (in Grosser, 1999:39; Feuerstein, Rand & Hoffman, 1979:539) and Vygotsky (in Patterson, 2008:24; Vygotsky, 1986:31), a learner's own culture plays a major role in his ability to learn. Individuals, who are deprived of their own culture, develop an inability to learn. They will have a reduced capacity to modify their intellectual structures in reaction to direct experience, to external sources of stimulation (Tzuriel, 2000:394; Grosser, 1999:39; Feuerstein, *et al.*, 1979:539). The educator should be aware of each learner's cultural background and should respect and recognise the different cultural values and perspectives (Lerner, 2006:226).

2.7.2 Language

Vygotsky regards language development and cognitive development as intertwined (in De Witt, 2009:106). Vygotsky is also of the opinion that the acquisition of language is promoted in a natural environment where human relationships help the young learner to become an active processor of language (De Witt, 2009:106; Larsen & Nippold, 2007:201; Lerner, 2006:332-336). He strongly advocates the importance of a reciprocal relationship between the young learner and an adult (parents or educator) where they influence one another's communication processes (*cf.* 3.2 & Figure 3.3). The adult should accept the role of mediator of learning (*cf.* 3.4; Figure 3.6) in order to shape learning opportunities to bring them to the attention of the young learner and to help the learner construct meaning. **Morphology** (meaning units in language), **phonology** (speech sounds) and **syntax** (grammar system of a language) components of a language should therefore

be firmly established during the preschool years, while **vocabulary** (semantics) continues throughout life (De Witt, 2009:106; Larsen & Nippold, 2007:201; Lerner, 2006:332-336).

The process of understanding verbal symbols is called **oral receptive language**. Receptive language is a prerequisite for the development of expressive language. Learners who have deficient oral receptive language cannot understand the meaning of a single word or even sentences. Such a learner might be able to understand a single word, such as *cat*, but find it difficult to understand the instruction of “*Colour the cat that sits in front of the box with your red crayon*” (cf. Appendix 5) (Lerner & Johns, 2009:265; Lerner, 2006:342-343).

According to Lerner and Johns (2009:265), Springer (2007:161), Nieman (2006:22), Lerner (2006:100) and Wes-Kaap Onderwysdepartement (2006:iv), effective teaching and learning depend on communication through appropriate, accessible language, therefore the advantage of education in the learner’s **mother tongue** during the first six years of schooling. It is widely recommended that the language of instruction should also be the learner’s **home language**. Learners who study through the medium of a language other than their home language struggle to cope with the linguistic demands of academic study. Defective language usage by role models, such as parents and educators, also contribute negatively to deficient cognitive development (Lerner & Johns, 2009:265; Nieman, 2006:22; Hugo, 2006:48; Larsen & Nippold, 2007:202; Lerner, 2006:100; Wes-Kaap Onderwysdepartement, 2006:31).

Language should be taught as a **thinking process**, encouraging active experiences to build thinking and language. Educators as well as parents should determine what the young learner already knows and provide **active experiences** to build meaning and thinking, because the more young learners use their experiences to increase their existing knowledge and language base, the more their language and meaning will develop (Lerner & Johns, 2009:265; Lerner, 2006:333).

Eggen and Kauchak (2010:46) assert that when young learners communicate with a mediator (parent or educator), he not only learns new words, he also learns how to pronounce them, what they mean, what they look, feel and/or taste like. Human beings talk to themselves in order to guide their thinking and action.

2.7.3 Perception

The absence of imperative perceptual skills has detrimental effects on the young learner's cognitive development. According to the viewpoints of De Witt (2009:61), Patterson (2008:149), Papalia *et al.* (2008:199) and Lerner (2006:477), perception is regarded as the **ability** to **organise** and **attach meaning** to stimuli.

During the pre-school years, young learners are intensely and actively engaged in learning. During these early years, they master many pre-academic skills and obtain an infinite amount of knowledge, information and abilities necessary for later learning. Visual and auditory skills, attention, expanding memory and thinking skills and learning to understand and use language are acquired during the pre-school years.

The ability to count with understanding, match, sort, compare and understand one-on-one correspondence depends on the young learner's experience in manipulating objects. In support of the arguments of De Witt (2009:61), Patterson (2008:149), Papalia *et al.* (2008:199) and Lerner (2006:477), I argue that if learners experience unstable perceptual skills, attention problems or difficulties in motor development, they most probably have had insufficient experience of the activities of manipulation that pave the way for understanding quantity, space, order, time or distance.

2.7.3.1 Spatial relationships

Papalia *et al.* (2008:190), Patterson (2008:192) and Lerner (2006:478) are of the opinion that children should, from a very young age, be involved in activities where they have to fit objects of various sizes into each other. These play activities assist the young child in developing a **sense of space**, **sequence** and **order**. The young learner should have ample opportunities to play with blocks, puzzles, models or construction type toys. If not, he may

miss out on early number-learning experiences imperative for succeeding in mathematics later in life.

2.7.3.2 Visual-motor and visual-perception abilities

De Witt (2009:61), Patterson (2008:149), Papalia *et al.* (2008:199) and Lerner (2006:479) concur that the development of visual-motor and visual-perception abilities should receive special attention in Grade R. Learners who have trouble counting objects in a series by pointing to each of them and saying, “one, two, three” may have difficulty with visual-motor and visual-perception abilities. These learners will also find it difficult to see objects in groups (or sets), which will cause difficulties in identifying numbers of objects correctly later on. Learners with visual-motor and visual-perception difficulties will not be able to identify geometric shapes as a complete and integrated entity, but will see them as unrelated lines. This can be problematic later on when working with numbers as well (De Witt, 2009:61; Patterson, 2008:149; Papalia *et al.*, 2008:199; Lerner, 2006:479).

2.7.3.3 Concepts of time and direction

Basic concepts of time and direction are acquired during the pre-school years. Learners with a poor sense of time and direction will experience problems with estimating (De Witt, 2009:61; Patterson, 2008:149; Papalia *et al.*, 2008:199; Lerner, 2006:479), e.g. how long it may take to complete an activity or the direction from school to home.

2.7.4 Genetic factors

Genetic or heredity (nature) factors are inborn traits or characteristics inherited from the biological parents. The environment (nurture) can also influence the child’s learning that comes from experience (Papalia *et al.*, 2008:12). The neurological functioning of a child, as well as a child’s unique personality, may cause him to be less receptive for MLE. This will result in deficient cognitive skills, which in turn will lead to poor performance academically, as well as socially (Grosser, 1999:41). In the genetic category, a distinction can be made between **physical factors**, **emotional** and **intellectual factors**:

2.7.4.1 Physical factors

Children's learning can also be influenced by factors such as poverty, death, the absence of a beloved carer, emotional and/or physical abuse, racial prejudice, homelessness, inadequate nutrition, deficient movement and motor development, lack of opportunities to play, and alcohol and drug abuse. The previously mentioned factors can have a devastating effect on the cognitive development of the learner (Prins, Venter & Hay, 2009:353; Hughes, 2008:40; Wes-Kaap Onderwysdepartement, 2006:31), and lead to behavioural and learning difficulties, including aggressiveness, withdrawal, depression, fearlessness, fearfulness, poor concentration and repetitive and disturbing behaviour.

2.7.4.1 Emotional factors

Disturbances in motor and perceptual development caused by the central nervous system not maturing in a normal manner lead to dissatisfaction with oneself (Lerner, 2006:527). Feelings of frustration and disappointment and an inability to achieve are experienced due to repeated failed attempts at mastering tasks. A low self-concept, sense of competence and self-worth are often permanent. These learners may react by **internalising** or **externalising** their emotional problems. An **internalising** reaction may appear as a conscious refusal to learn, a resistance to pressure or mediation, clinging to dependency, quick discouragement, a fear of failure, sadness and withdrawal into their own world (Lerner & Johns, 2009:190; Nieman & Pienaar, 2006:94; Lerner, 2006:527). An **externalising** reaction can take the form of overt hostility, acting-out behaviour, excessive anger, fighting with other children, rebelliousness towards educators and disruptive behaviour. They may be preoccupied with other problems (such as marital stress, parental approval, self-esteem) that prevent them from successfully completing learning tasks (Lerner, 2009:189-190).

2.7.4.3 Intellectual factors

According to Lerner (2006:229-330), early warning signs of intellectual problems in pre-school learners are late talking compared to other children of the same age, pronunciation problems, slow vocabulary growth, having

difficulty in identifying rhyming words, experiencing trouble with learning numbers, the alphabet, days of the week, being extremely restless and easily distracted, finding it difficult to interact with peers and poor ability to follow directions, deficient gross- and fine-motor skills and experiencing difficulty in auditory and visual processing and attention.

2.7.5 Non-intellective factors

Benjamin (2009); Feuerstein *et al.* (2007:23, 24); and Tzuriel (2001:50-55; 72-73) argue, that **non-intellective factors** play also an enormous role in the cognitive development of all learners. According to Tzuriel (2001:72), **cognitive functioning** and **motivational-affective** factors are considered to be integrated and inseparable (Tzuriel, 2001:72). The following non-intellective factors are intrinsically related to cognitive development and change:

- **Lack of accessibility to mediation** means that the learner actively rejects all attempts by the mediator to teach or he simply passively withdraws from the teaching situation. Usually learners who lack accessibility to mediation encountered previous negative experiences with a mediator or were over-mediated.
- **Need for mastery** is critical for determining test results, learning processes and school achievement. This includes the learner's determination to complete a task successfully, attempt to work on his own, pleasure in coming to a solution and willingness to keep on working. The mediator plays an important role in motivating, focusing and challenging the learner.
- **Frustration tolerance** incorporates the learner's persistence in completing a task even though he cannot find a solution. The mediator's role is to control the learner's frustration by ensuring high rates of success and preparing him for difficult activities.
- **Locus of control** refers to the learner's perception of himself as being responsible for his behaviour and control over life events. Sporadic responses, guessing behaviour, passive approach towards problem-solving, blaming others for mistakes are all aspects of locus of control.

- **Fear of failure and defensiveness** are extremely important factors in learning and performance, because activities may remind the learner of previous failures and seem to be too difficult to deal with.
- **Confidence in a correct response** includes the learner's self-assurance in his response. Uncertainty and doubt are often related to emotional attitudinal variables which have little to do with the learner's cognition.
- **Vitality and alertness** refer to the level of activity, energy, attentiveness, vibrancy and interest the learner shows in the interaction with the mediator.

2.7.6 Parents and home

De Witt (2007:1) is of the opinion that a child belongs to a certain family and within this context; the family should **interpret** the world for him, as well as **foster** understanding of and value for his own culture. If this is lacking, the child could experience a cultural barrier, which may rupture the child's intellectual abilities and could leave him intellectually deprived. The young learners' experience in the first five to six years influences cognitive development and lays the foundation for later school performance. Parents, the child's first educators, play a vital role in providing intellectual stimulation, emotional well-being and a supportive learning environment, encouraging self-discipline and setting boundaries and realistic goals. Parents' should encourage and support the young child by developing his self-concept, self-esteem, interest in literacy and a curiosity about learning (Eggen & Kauchak, 2010:62-64; Springer, 2007:161; Lerner, 2006:96; Grosser, 1999:39). Financial, socio-economic and educational status also has an impact on the development of the child, while marital stress and domestic violence also influence school performance (De Witt, 2007:1; Springer, 2007:161). Illiterate and/or uninvolved parents, lack of exposure to books and educational stimulation, inadequate nutrition and exposure to teratogens, such as heavy misuse of alcohol during pregnancy and malnutrition, result in delayed cognitive development. A dysfunctional home environment contributes to cognitive developmental problems (Patterson, 2008:259; De Witt, 2007:1; Springer, 2007:161; Wes-Kaap Onderwysdepartement, 2006:31).

As this study focused on classroom practice as an important factor in optimising cognitive development stronger focus will be placed on the role of classroom practice in optimising cognitive development.

2.7.7 Educator's classroom practices

The educator plays an extremely important role in the development of cognitive thinking. By performing the role of a go-between or mediator, the educator will help the learner to:

- distinguish between relevant and irrelevant information;
- distinguish between similarities and differences;
- develop an understanding of cause and effect;
- develop a logical sequence of events in time and space; and
- derive and formulate rules (Grosser, 1999:41).

An educator who acts as a mediator will always bring subject content and other contexts outside the classroom in relation with one another. This ensures that learners will apply thinking processes and strategies already taught, which result in learners who understand the structure, order and predictability of the world and the necessity of thinking principles to order the world around us (Grosser, 1999:41). If this is not the case, learners will become empty vessels, they will be passive in their learning and thoughts, only receiving information without learning to think critically and solving problems. The educator will only be able to reach the above-mentioned goals when providing the learner with a nurturing learning environment (Lerner, 2006:96).

Lerner and Johns (2009:190) and Kaufmann (2005:89) highlights the importance of the learning environment that should be a place where learners experience success. Therefore, educators should restructure tasks to assure success. Educators should find each learner's area of strength and capitalise on that. This will reduce feelings of inadequacy, decrease anxiety and increase learners' belief in themselves (Lerner & Johns, 2009:190; Kaufmann, 2005:89). The educator should model positive and peaceful behaviour, provide routine, structure and organisation within the classroom, establish

clear expectations in the classroom, create an environment of caring and success, understand and respect the diversity of learners in the class and create a physically appealing and beautiful classroom (Lerner & Johns, 2009:205).

An aspect that educators should keep in mind is their language usage. Educators' language should be clear, precise and match the learner's level of understanding. Utilising visual support could also strengthen teaching and learning. A positive and compassionate relationship between the educator and learner should be based on acceptance of the learner as a human being worthy of respect. Educators should also emphasise the importance of listening skills (Lerner, 2006:106,351).

Educators should be aware of teaching perspectives that can be utilised in the classroom. Pratt (in Deggs, Machtmes & Johnson, 2008:1; Hunt, Barret, Lex Grapentine, Liguori & Trivedi, 2008:358; Fung & Chow, 2002:314; Pratt, Collins & Selinger, 2001:3) clearly distinguishes between teaching perspectives and teaching styles. A **teaching perspective** can be defined as what we as educators do and why we think our actions are worthy and justified, while a **teaching style** can be defined as those permanent personal qualities and behaviours that appear in how we conduct our class (Deggs *et al.*, 2008:1; Hunt *et al.*, 2008:358; Fung & Chow, 2002:314; Pratt *et al.*, 2001:3).

Pratt identifies five perspectives regarding successful teaching (Pratt *et al.*, 2001:3-4; Pratt, 1992:210-217). Each of these will be briefly elucidated and their merits in terms of cognitive development will be singled out.

A **Transmission perspective** to teaching means that effective teaching requires considerable commitment to the content or subject matter. The educator should have an excellent background of the content in order to transmit information. Good educators provide clear goals, adjust the pace of lecturing, effectively utilise class time, answer questions, provide feedback and reviews, set high standards for achievement and develop objective means of assessing learning (Deggs *et al.*, 2008:2; Hunt *et al.*, 2008:358; Kramer, 2007:100-108; Fung & Chow, 2002:314; Pratt *et al.*, 2001:3-4; Pratt,

1992:210). They are enthusiastic and pass their enthusiasm on to their learners.

I argue that a **transmission** perspective draws a parallel with **Direct teaching, since** instruction is educator-centred and behaviouristic and assimilative in nature and will not be extremely effective for cognitive development if not varied with other teaching perspectives (*cf.* 2.6.2; Figure 2.3). According to **Assimilative learning** learners need to acquire new information that can easily fit into their pre-existing knowledge structures, Assimilative learning is therefore the unchallenged and untested acceptance of a belief as true, factual or real, whereas **transformative learning** involves examining an “assimilative” learned belief. However, when the learner’s prior thinking patterns are changed because of examining and testing a certain belief by exploring alternatives, transformative learning has taken place (Hubs & Brand, 2005:63; McGonigal, 2005:1-4). In this regard, an apprenticeship or developmental perspective to teaching and learning which is learner-centred in nature is then adopted.

For Deggs *et al.* (2008:2), Hunt *et al.* (2008:358), Kramer (2007:100-108), Fung and Chow (2002:314), Pratt *et al.* (2001:3-4) and Pratt (1992:210), an **Apprenticeship** approach supports a socio-constructivist approach to teaching and learning, and views teaching and learning as a process whereby learners are put into a set of social norms and social ways of working with others in order to develop from dependant learners to independent workers.

Educators with a **Developmental** perspective, see themselves as facilitators of learning (Pratt, 1992:210). This implies that effective teaching should be planned and conducted from the learners’ point of view. Educators should understand how their learners think and reason in order to optimise and develop cognitive structures. Educators should adapt their knowledge to the learner’s level of understanding and ways of thinking.

Both of the aforementioned approaches have a high potential for building higher-order thinking skills, personal values and individual responsibility for learning, as learners have to create their own understanding of concepts by

analysing the evidence gathered through their learning activities (Deggs *et al.*, 2008:2; Hunt *et al.*, 2008:358; Kramer, 2007:100-108; Fung & Chow, 2002:314; Pratt *et al.*, 2001:3-4; Pratt, 1992:213).

During transformative learning, learners are expected to consider, evaluate and revise underlying assumptions that can be emotionally challenged experiences. Since resistance to perspective transformation is conventional, educators who wish to facilitate transformative learning should create a learning environment that encourages and rewards intellectual openness (Kramer, 2007:100-108; Hubs & Brand, 2005:63; McGonigal, 2005:1-4). According to Pratt (1992:214) the following strategies that can be useful in transformative learning are:

- Anything that will trigger learners to evaluate their thinking and the possible limitations of their understanding.
- Identifying current assumptions in order for learners to explain their thinking.
- Encouraging critical reflection which requires learners to privately evaluate their current assumptions.
- Encouraging critical discourse between learners.
- Providing learners with the opportunity to test a new paradigm or perspective in order to apply new knowledge.
- Fostering intellectual openness by keeping a close balance between support and challenge.

A **Nurturing** perspective denotes that effective teaching assumes that long-term, hard, persistent effort to achieve comes from the heart, as well as the head. Learners should be nurtured to solve problems without a fear of failure. Good educators promote a caring, trusting learning environment while providing encouragement and support together with clear expectations and goals for all learners. For Deggs *et al.* (2008:2), Hunt *et al.* (2008:358), Fung and Chow (2002:314), Pratt *et al.* (2001:3-4) and Pratt (1992:215) nurturing educators guide their teaching by a primary concern for the worth and dignity of each learner, mutual trust, rightful dignity and reciprocal respect.

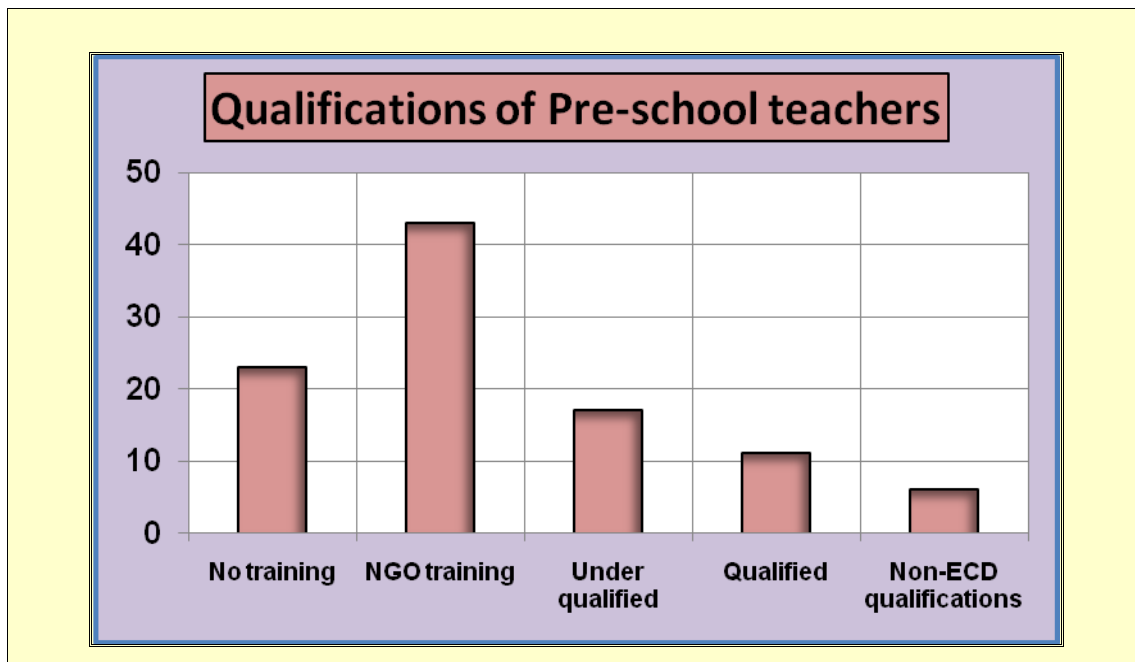
A **Social reformist** perspective suggests that effective teaching seeks to change society as a whole significantly (Deggs *et al.*, 2008:2; Hunt *et al.*, 2008:358; Kramer, 2007:100-108; Fung & Chow, 2002:314; Pratt *et al.*, 2001:3-4; Pratt, 1992:217).

I am of the opinion that Transmission, Direct and Assimilative perspectives to teaching appear not to **challenge** learners' **critical** and **creative** thinking skills optimally, due to the passive roles learners play in classrooms dominated by these perspectives. Therefore, a **Transformative, Developmental and Independent perspective to teaching and learning** would better optimise higher-order cognitive thinking, because this perspective fosters the creation of an intellectually open learning environment in which learners can create their own thinking and understanding.

2.7.8 Educator training

According to De Witt (2007:1), the quality of pre-school programmes in South Africa in general as well as the knowledge and understanding of caregivers regarding young children, urgently need attention. Current pre-school programmes worldwide are inadequate and implemented ineffectively which result in young learners not receiving programmes needed to promote their developmental well-being. Higher levels of pre-school quality care will optimise social skills, reduce behaviour problems, increase co-operation and improve language skills in children (De Witt, 2007:2). Figure 2.4 reflects the educational qualifications of current pre-school educators and practitioners (Janse Van Rensburg, 2010; Williams & Samuels, 2001).

Figure 2.4: Qualifications of pre-school educators and practitioners



The information in Figure 2.4 is of great concern and could hold serious implications for the cognitive development of learners. A number of pre-school educators or care-givers appear not to be adequately trained in the different methodological approaches regarding how to teach pre-school children and are not aware of the developmental phases of pre-school children (De Witt, 2007:6,9; Springer, 2007:161; Lerner, 2006:186).

According to Lerner (2006:229), educators should not follow the “wait and fail method” to identify young learners with learning difficulties, but should rather evaluate precursors of learning disabilities. Research worldwide proves and values the importance of early identification of young learners with learning difficulties and subsequent intervention.

Prospective educators should receive thorough training in all areas of early childhood development, that is physical, emotional, social and cognitive (Clasquin-Johnson, 2007:29; Davin & Van Staden, 2005:xii; Anon., 2004; Dunn, 2004). They should be taught to build and link new information to prior knowledge when teaching, because the more one knows about something, the more one can attain through a learning experience.

Another very important aspect of student training should include strategies regarding the provision of a supportive learning environment and reciprocal relationship between educator and learner, because the educator provides the necessary support for the learner to learn and grow. Vygotsky's **scaffolded instruction** (*cf.* 2.6.3.1) is an example of providing an environment conducive for learning, because the educator offers support until the learner can work independently. Student educators should also be taught the importance of developing automaticity in certain skills, such as sight words or the sequence of the days of the week. This will enable learners not to waste energy on automatic information and rather tackle other areas of learning. Motivation plays a vital role in any kind of performance; therefore activities that will motivate learners to want to learn should be accentuated. Learners should enjoy the learning experience. By utilising an extrinsic variety of innovative and interesting learning activities, an intrinsic motivation will develop within the learner. The educator should then answer the learner's attempt with enthusiasm and sincerity (Lerner, 2006:186).

2.7.9 Lack of resources

For Brewer (2007:32) and Gallagher (2005:12) an enriched living and learning environment encourages more connections between the neurons of the brain and creates more possibilities for solving problems. According to my viewpoint, an enriched living and learning environment can be described as a developmentally appropriate environment offering various active and stimulating experiences that provide increased connections in the brain as well as a reduced level of stress hormone. In very poor communities where no basic equipment exists to provide quality education, such as books, blocks, jungle gyms, etc., learners, especially young learners, are not surrounded with a stimulating environment and activities. This lack of resources can impact adversely on the cognitive development of learners. Even educators who are serious about quality education find it difficult to teach without basic resources, such as puzzles, books, crayons, clay, paper, scissors, etc. (De Witt, 2007:6,7).

2.7.10 Lack of mediated learning

In support of Fraser (2006:1,6) I argue that educators who still follow a content-based teaching approach and who still consider themselves as sole conveyers of information by means of text books, produce passive learners who will never be able to actively construct meaning from the learning material (cf. 3.3). These educators are merely transmitters of knowledge and learners are at the receiving end of information without constructing their own meaning thereof.

In contrast to a content-based approach lies the mediational learning approach, where learners acquire new knowledge through active interaction with their environment. They are provided with the opportunity to construct their own sense of what is being learned instead of merely relying on the educator's lectures (Fraser, 2006:6). In a mediational classroom learners have a chance to reflect on and interpret own experiences (Fraser, 2006:7,8).

The benefits of mediated learning for cognitive development are central to this study and explored in detail in Chapter Three.

As determining the research participants' cognitive development was a focus of the empirical research, I had to explore ways according to which the assessment of cognitive development appears to be most effective.

2.8 ASSESSING COGNITIVE DEVELOPMENT

It was important to investigate trustworthy and valid assessment methods in order to determine cognitive development in Grade R-learners. Two opposite assessment approaches can be administered when evaluating cognitive development in individuals, namely **Static Tests (ST)** or traditional psychometric tests and **Dynamic Assessment (DA)** (Papalia *et al.*, 2008:281, 283; Tzuriel, 2001:1).

2.8.1 Static Assessment

Static Tests (ST) are formal standardised psychometric testing procedures in which the examiner tests the learner's cognitive ability without any effort to change, guide or improve the learner's performance and provide learner support. During static assessment, an examiner simply records and scores

the learner's responses, which provide only a limited measure of a person's abilities. In other words, ST is related to passive acceptance of a learner's learning difficulties (Lerner, 2006:67; Tzuriel, 2001:1). Static Tests predict future failures and successes in relation to academic achievement criteria. They only produce indirect and non-specific information regarding the nature of a learner's problem as is manifested in the learning content (Lidz, 2003:112).

The **Stanford-Binet Intelligence Scales** are individual intelligence tests for ages two years and older. These tests measure knowledge, quantitative reasoning, visual-spatial processing and working memory. Another static test is the **Wechsler Preschool and Primary Scale of Intelligence**, which can be used on children of 2½ to seven years of age. This test concedes verbal and performance scores as well as a combined score (Patterson, 2008:312; Papalia *et al.*, 2008:282; Lerner, 2006:75). These two static tests are not applicable for South African children. In line with the criticism regarding static tests according to Lerner (2006:69), I argued that ST may:

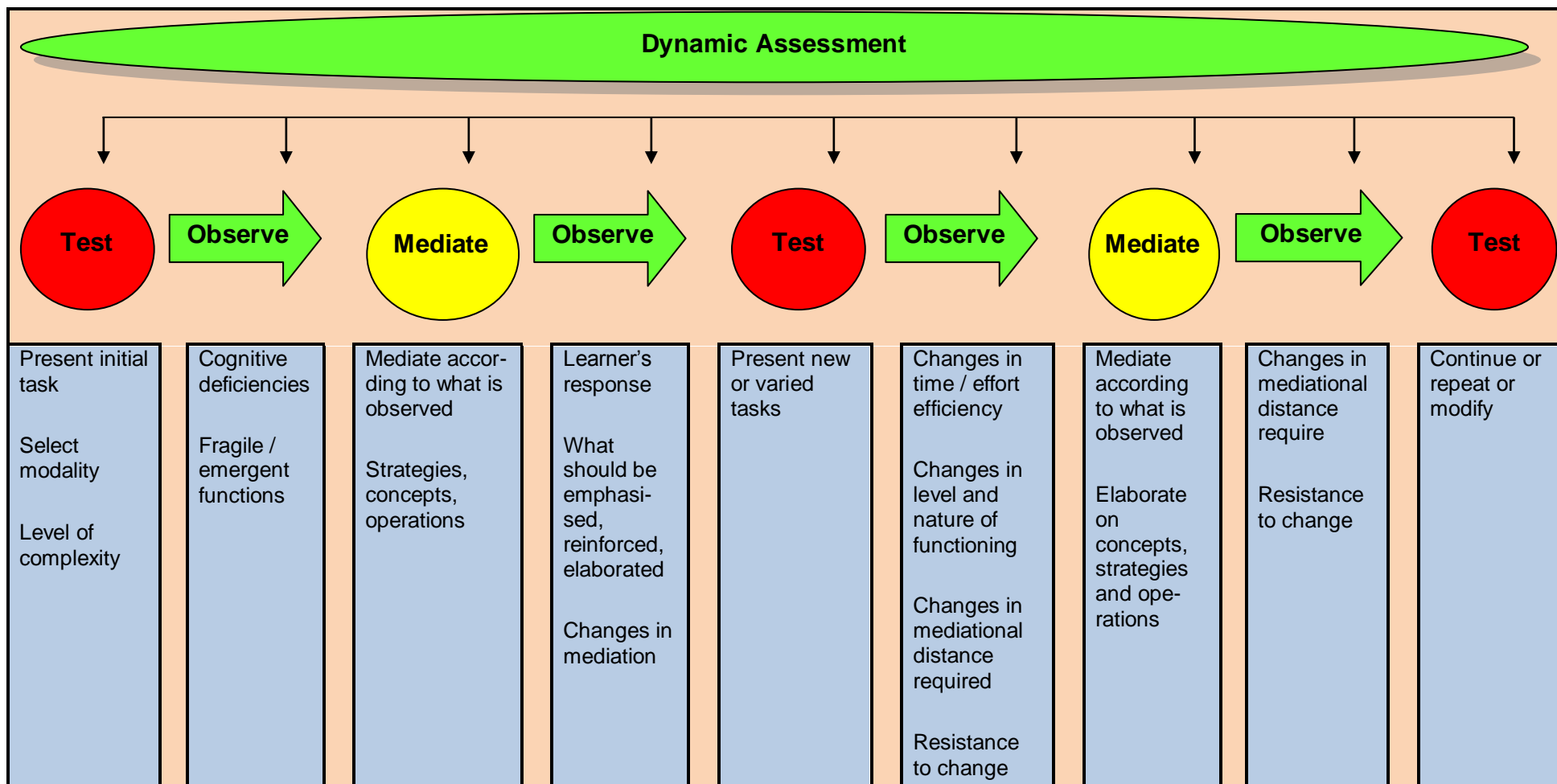
- not provide enough crucial information about the learners cognitive development in terms of nature and quality;
- not provide information regarding deficient cognitive functions responsible for learning difficulties; and
- not relate to cognitive functions and non-intellective factors that can influence the individual's cognitive performance.

Vygotsky suggested an alternative approach based on the idea of ZPD and called it Dynamic Assessment (DA) (Lidz & Gindis, 2003:102), which I found appropriate to use in the context of my study.

2.8.2 Dynamic Assessment (DA)

Dynamic Assessment utilises a **test-teach-retest** approach as depicted in Figure 2.5 (adapted from Falik, 2006).

Figure 2.5: The test-teach-retest approach of dynamic assessment



The test and retest part of the assessment process consists of measurement of a targeted area. The teaching part of the assessment focuses on observing, intervening and helping the learner to learn and use strategies to better understand the focus of the task and perform better on targeted test tasks (Moore-Brown, Huerta, Uranga-Hernandez & Pena, 2006:210). More important is that DA focuses on providing mediated learning that is responsive to the young learner's needs. The examiner (mediator) provides MLE and carefully observes the learner's learning style. The mediator provides or takes away teaching and learning aids (scaffolding) as the learner needs them.

Vygotsky believes that children learn by internalising the results of interactions with adults and that this interactive learning is most effective in the ZPD (*cf.* 2.6.3.1) (Papalia *et al.*, 2008:283). The ZPD can be assessed by dynamic tests, which provide a better measure of children's intellectual potential than traditional psychometric tests or static tests. Together with scaffolding by parents and educators, the child's cognitive progress can be efficiently guided, by means of leading questions, giving examples or demonstrations and offering feedback. Other than static tests, dynamic tests as such can be regarded as a learning situation (Papalia *et al.*, 2008:363; Lerner, 2006:72; Lidz & Gindis, 2003:99) different from that of static assessment. Feuerstein *et al.* (in Tzuriel, 2001:47) refer to certain goals of DA.

2.8.2.1 Goals of dynamic assessment

Dynamic assessment can be regarded as assessment by means of an active teaching process concerning a learner's thinking, perception, learning and problem-solving (potential more than current achievement) (Snow & Van Heme, 2008:425; Falik, 2006; Lerner, 2006:72; Lidz & Gindis, 2003:100, 101; Benjamin & Lomofsky, 2002:102-103; Tzuriel, 2001:6, 47-48; Pena *et al.*, 2001:2):

- DA focuses on assessment of learning problems.
- During DA the mediator determines the **initial performance level of the learner**, by assessing the ability of the learner to understand the principle underlying an initial problem and to solve it.

- Another important aim of DA is to assess the **nature and amount of mediation** required to teach a learner a given rule or principle. The mediator should be sensitive regarding being firm and demanding and when to be soft and comforting; when to intervene and when to withdraw from mediation. In this instance the learner will guide the mediator, because this specific approach depends on the learner's responses, deficient cognitive functions, mental set, accessibility to mediation, level of competence, type of cognitive and motivational orientation, circumstantial factors and individual history (Tzuriel, 2001:47-48).
- One of the essential elements of DA is to determine what **deficient cognitive functions** are responsible for failure in performance and how modifiable they are because of mediation. The role of the mediator is to modify deficient cognitive functions and observe changes in the learner's performance following the intervention. According to Tzuriel (2001:48), the young learner's cognitive functions are still in a process of development and are difficult to define as deficient. In the **CEPP** I indicated these deficient cognitive skills as "emerging".
- **Non-intellective factors** are also regarded as imperative in DA, because these factors may also impact negatively on the performance of learners' cognitive development. DA takes a holistic approach where cognitive, emotional and behavioural trends are observed and modified if necessary. According to Tzuriel (2001:48), some learners show resistance to accepting mediation, even though it is clear that the mediator will not provide the answers. Tzuriel (2001:48) argues that these learners become "immune" to mediation, because they have been over-mediated in the past. This can also be contributed to lack of mediational situation in the learner's home environment. On the contrary, learners who show inaccessibility to mediation can also be bright learners who decode the assistance offered by the mediator as failure on their part (Tzuriel, 2001:48).
- The **maintenance and transfer of learning** play a critical role in DA, because the mediator should determine to what extent the newly learned cognitive principle is maintained and applied (transfer) in more difficult

problems. If the learner performs well in a more difficult problem, it can be an indicator that transfer of learning took place.

- The different learning preferences of learners are also addressed in DA by means of **type of modality**. Some learners prefer visual presentation of a problem while others prefer verbal, pictorial or numerical presentation of problems. According to Tzuriel (2001:49) most five- to six-year olds prefer solving seriation problems by focusing on the number dimension, although “number” is considered more abstract than for example pictorial presentations.
- The last goal of DA is to assess the **effects of different mediation strategies**. Some learners will respond confidently when mediation for meaning is carried out by means of the emotional tone and enthusiasm of the mediator. Other learners will respond positively when mediation for transcendence is carried out by means of rules, principles and generalisations. The mediator should be sensitive to the different strategies, as simple versus complex will include analogies, seriation and sequential progression, while language of presentation will include figural, numerical and verbal strategies (Tzuriel, 2001:49).

DA aims at altering the cognitive functioning of an individual while observing ensuing changes in the testing and observation situation with regard to learning and problem-solving patterns. Learners are engaged in active and flexible instruction and educators observe how well the learner can learn under favourable conditions (Snow & Van Heme, 2008:425; Lerner, 2006:72; Lidz & Gindis, 2003:100, 101; Benjamin & Lomofsky, 2002:102-103; Tzuriel, 2001:6). DA is an active modification of a learner’s learning difficulties by means of intensive mediation and the establishment of relatively high cognitive goals (Tzuriel, 2001:1). Dynamic assessment indicates what a child is ready to learn and therefore provides educators with useful information and guides them in constructing interventions in order to assist the child’s progress (Papalia *et al.*, 2008:363; Lerner, 2006:72). A decrease in mediation during DA indicates modifiability and that the learner shows progress despite the fact that functioning is not yet independent (Tzuriel, 2001:49).

2.8.2.2 The course of dynamic assessment

Dynamic assessment occurs during three phases. During the first phase, learners receive a pre-test, which is in effect the same as a static test. No mediation takes place during the first phase. After completion of the pre-test, learners receive instructions regarding the skills and principles of problem-solving they came across in the pre-test. This phase can also take the form of an intervention and includes mediation, as was the case in this study. Each intervention represents instructional strategies relevant to the test task. After the instruction or intervention phase, learners are again tested by means of a post-test. The post-test is the same as but different from the pre-test and no mediation takes place during this phase. The contents of the instruction, as well as the amount of instruction, may vary according to the individual's needs or circumstances (Lidz & Gindis, 2003:104, 108).

During the instruction or intervention phase, learners are presented with items to solve. If solved correctly, the next item is presented, but if the learner cannot solve the item correctly, a series of hints follows. These hints aim to make the solution of the item clearer. It is during this phase that mediation plays an imperative role. The mediator intervenes intentionally, taking a leading and guiding role that is sensitive and responsive to the learner's responses and abilities and offering strategies and principles of problem-solving. The mediator should also determine how many and what kind of hints are necessary to assist the learner in solving the problem correctly. The mediator keeps on encouraging the learner to solve the problem. If the learner successfully solves the problem, the next item is presented to him. If he cannot solve the problem, the mediator demonstrates the problem solution and the next item is presented to the learner (Lidz & Gindis, 2003:104, 109).

2.8.2.3 Results of dynamic assessment

Research conducted by Klein, Tzuriel and Kaufmann regarding DA and deaf learners, DA and culturally different learners and DA and learners with language deficits, showed evidence of higher pre- to post-test improvement in performance, as well as increased improvement two weeks after the post-test administration (in Tzuriel, 2001:121; Pena *et al.*, 2001:2). This can be

attributed to effective mediation in the DA process that allows undeveloped cognitive capacities to mature, as well as observing learning processes and going beyond the learner's manifested cognitive performance. According to Tzuriel (2001:127), when DA is executed using MLE, higher performance is scored.

Learners who are deprived of mediation processes within their families due to socio-cultural reasons are not prepared to cope with tasks and recognise the mediation offered to them by mediators. This is related to the impact of cultural changes on the individual's zone of proximal development (ZPD), the effects of mediation on optimising cognitive alertness, internalisation of different symbolic mental tools and resilience in coping with cultural disparity (Tzuriel, 2001:121-122; Pena *et al.*, 2001:2; Tzuriel, 2000:394).

Various approaches to developing the cognitive skills of learners have been utilised through the years, and I had to determine an approach that my intervention would follow.

2.9 APPROACHES TO COGNITIVE DEVELOPMENT

Although education systems worldwide claim to facilitate the development of thinking skills, few systems really teach thinking skills (Maclure & Davies quoted by Grosser, 1999:85; Paour & Cèbe, 1999:283). However, various approaches to the development of thinking skills exist. For the purpose of this study, I will discuss the three major approaches, namely the programme approach, the infusion approach and the holistic approach.

2.9.1 The Programme approach

The programme approach to the development of cognitive skills implies that individuals control their own thinking and learning process and is based on the analysis of thinking skills, which can be practiced and taught separately. In other words, when thinking skills are taught in one subject, learners are not always able to apply (transfer) these thinking skills to other subjects. The programme approach was not applied in the study because I argue that cognitive skills should be taught in an interrelated manner linked to subject content so that they can be applied in other areas of learning as well.

2.9.2 Infusion approach

The infusion approach integrates direct instruction in thinking skills (teaching of thinking) and use of methods to promote thinking in curriculum context (teaching for thinking).

According to Dewey and Bento (2009:329), an infusion approach can be described as *"infusing teaching for thinking into regular classroom instruction by restructuring the way traditional curriculum materials are used"*. This implies that lessons should be structured in such a way that learners will be able to gain and apply what they called the "ingredients" of thinking, both in academic work across the curriculum and in everyday living. This resulted in *"infused thinking skill lessons"*. These lessons include activities that are reliable, ask for causal explanation and the use of evidence for inference, which will develop meta-cognitive awareness in the learners. This can be done by shaping the content of a lesson around certain thinking skills that will ensure that the learners become more aware of the thinking skill, understand it better and apply it in other areas of learning, both inside and outside the classroom. An infusion lesson contains three basic features:

- active structured use of thinking skills;
- creating an awareness of the thinking that students are doing; and
- varied reflective practice in applying the skill.

As my study focused on the application of cognitive skills in an integrated manner linked to curriculum-based content, an infusion approach to cognitive development was incorporated in the design of my intervention programme.

2.9.3 Holistic approach

In the holistic approach, thinking skills form part of the entire teaching-learning situation where inquiring, teaching methods, learning activities and assessment are simultaneously geared at developing thinking skills (Gravett, 2005:19; Henson, 2004:6; Grosser, 1999:89) in contrast to the programme approach where thinking skills are taught separately from the teaching-learning situation.

According to Patel (2003:272) a holistic teaching approach develops learners' critical thinking, confidence and independence. It aims at making learning a process of self-improvement that recognises the self and the social context as well as the needs of the individual learner in the interaction. The social context plays an important role, because the exchanges that take place within this social action form the foundation for developing critical thinkers.

As I wanted the participants of the study to develop as critical, confident and independent learners who can apply what they have learned to other, real-life or new learning situations, I also regarded a holistic approach to teaching and learning as important. The creation of a stimulating learning environment where participants are actively engaged in their own learning, where they can organise their thoughts when executing learning activities, as well as reflect on their thinking and performance was regarded as imperative for the design and implementation of my intervention programme.

With the aforementioned discussion in mind, I combined an infusion and holistic approach to cognitive development in this study.

2.10 CHAPTER SUMMARY

The literature study conducted in this chapter guided the research of my study as follows:

The literature study enabled me to identify what constitutes cognitive development. I focused on the development of inter-related meta-cognitive and cognitive skills and strategies (*cf.* 2.2), the improvement of cognitive functions in the Input, Elaboration and Output phases of the learning process (*cf.* 2.4) needed for reasoning problem-solving, classification, categorisation and inferential thinking (*cf.* 2.3) as well as the development of non-intellective factors (*cf.* 2.7.5).

My approach to the cognitive development of Grade R-learners was mainly guided by the cognitive and constructivist learning theories of Piaget, Bruner, Ausubel, Vygotsky, Bandura and Feuerstein who advocate for active, interactive, discovery and social learning (*cf.* 2.6). According to their theories, the educator plays a critical role in the cognitive development by modelling and mediating cognitive processes to learners.

The nature of cognitive development of the Grade R learner was explored (*cf.* 2.3) and guided the structuring of learning activities for the intervention programme, which incorporated the development of symbolic thought (representational drawings, written symbols, names and numbers), cause and effect (flexible causal reasoning), classification and categorisation (putting objects, people and events into meaningful groups), problem-solving (solving everyday problems by utilising strategies and rules), conservation (realising that the number or volume of a group stays the same irrespective of the change in shape or arrangement), basic concepts (difference between big and small, thick and thin, full and empty and identifying, among others, shapes, numbers and letters), memory (retrieval of information) and language (use of and understanding language).

I acknowledged the current scenario in South African schools (*cf.* 2.5), which includes the development of each learner to his full potential to become a critical thinker who will participate successfully in his family, community, society and work environment. These aspects confirmed my belief in the importance and relevance of conducting a study on cognitive development.

It would not have been possible to identify a theoretical framework for my intervention programme, if I did not make a thorough study of theoretical perspectives, such as behaviourism (behaviour can be formed by the response following a particular action), cognitivism (learners are active processors of information in their own learning), constructivism (individuals construct their own meaning and knowledge from their own experiences), socio-constructivism (learning is a social process) and cognitive constructivism (individuals construct their own sense of learning material by making relationships among the ideas) (*cf.* 2.6). Evaluating these theoretical perspectives to teaching and learning enabled me to identify the cognitive and constructivist perspectives as suitable for a study that focuses on cognitive development.

The factors influencing the cognitive development of individuals (*cf.* 2.7) were then under surveillance. A myriad of aspects such as cultural neglect and social environment (*cf.* 2.7.1), language (*cf.* 2.7.2), perception (*cf.* 2.7.3), genetic factors (*cf.* 2.7.4), physical factors (*cf.* 2.7.4.1), non-intellective

factors (cf. 2.7.5), parenting styles and home environment (cf. 2.7.6), educators' classroom practices (cf. 2.7.7) and a lack of mediated learning experiences (cf. 2.7.10) were identified. In my study, I in particular focused on illustrating how classroom practice can be shaped to optimise cognitive development.

The assessment of cognitive thinking was examined (cf. 2.8) and I specifically looked at static assessment that entails formal standardised testing procedures with no room for learner support (cf. 2.8.1), and dynamic assessment where a test-teach-retest approach includes intervention to optimise and correct problematic cognitive skills (cf. 2.8.2). Three approaches to cognitive development were explored (cf. 2.9), including the programme approach, which puts forward the belief that cognitive thinking skills should be dealt with separately. The infusion approach advocating the belief that cognitive thinking skills should be taught in an integrated manner linked to subject content (cf. 2.9.2) and the holistic approach (cf. 2.9.3) which argues for a cognitive approach regarding all the aspects of the teaching and learning situation.

In this chapter cognitive development, the importance of enhancing the cognitive development of young learners as early as possible and how to optimise cognitive and meta-cognitive skills and strategies, cognitive functions and non-intellective factors that play a role in cognitive development, were explored. A mediated learning approach to cognitive development will be comprehensively deliberated in Chapter Three



*I cannot change the environment,
but I can change how learners think
to make them stronger
and enable them to cope and understand!"*

~ Anonymous