Effectiveness of Metacognitive Instruction on Reading Comprehension among Intermediate Phase Learners: Its link to the PASS Theory

The Discipline of Speech Pathology and Audiology
School of Human and Community Development
Faculty of Humanities
University of the Witwatersrand

In partial fulfilment of the requirements for the degree PhD

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Declaration

I hereby declare that this dissertation is my own work. It is being submitted for the degree of PhD in the Discipline of Speech Pathology and Audiology, in the School of Human and Community Development, University of the Witwatersrand, Johannesburg. It has not been submitted previously for any degree or examination.

__________________________

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Date: 30 September 2011

Place: Johannesburg
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“You can do all things through Christ who strengthens you” (NIV).

May my reflections on her life lessons, forever keep me humble, appreciative and grateful for all that I have. Also for me to be a blessing to others wherever and whenever I have the opportunity, to make a positive difference.
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List of Abbreviations:

ANOVA – Analysis of Variance
ATI – Aptitude Treatment interaction
C2005 – Curriculum 2005
CAPD – Central Auditory Processing Disorder
CAS – Cognitive assessment System
CEA – Cognitive Enrichment Advantage
CELF 3 – Clinical Evaluation of Language Fundamentals- Revision Three
CT – Critical Thinking
DET – Department of Education and Training
DoE – Department of Education
EAL – English Additional Language
EBP – Evidence-based Practice
EFA – Education for All
EMS – Economic Management Sciences
Exp G1 – Experimental Group one
Exp G2 - Experimental Group two
FIE – Feuerstein’s Instrumental Enrichment
FS – Full Scale
HoA – House of Assembly
HoD – House of Delegates
HoR – House of Representatives
ICAE – International Council for Adult Education
IQ – Intelligence Quotient
JET – Joint Education Trust
LD – Learning Difficulty
LLD – Language-based Learning Difficulty
LO – Learning Outcomes
LoLT – Language of Learning and Teaching
MCQ – Multiple Choice Questions
MLE – Mediated Learning Experience
NCS – National Curriculum Statement
NECG – Non-Equivalent Control group
NQF – National Qualifications Framework
NS – Natural Sciences
OBE – Outcomes-based Education
OBE/T - Outcomes-based Education and Training
PASS – Planning, Attention, Simultaneous and Successive processing
  - MN – Matching Numbers
  - PCd – Planned Codes
  - PCn – Planned Connections
  - EA – Expressive Attention
  - ND – Number Detection
  - RA – Receptive Attention
  - NVM – Nonverbal Matrices
  - VSR – Verbal Spatial Relations
  - FM – Figure Memory
  - WS – Word Series
  - SR – Sentence Repetition
  - SQ – Sentence Question
PBI – Process-based Instruction
PEI – Presidential Education Initiative
PI – Planning Instruction
RNCS – Revised National Curriculum Statement
SACMEQ – Southern African Consortium for Monitoring Educational Quality
SADTU – South African Democratic Teachers Union
SAQA – South African Qualifications Authority
SCM – Structural Cognitive Modifiability
SD – Standard Scores
SES – Socio-Economic Status
SLT – Speech Language Therapist
TBI – Traumatic Brain Injury
UNESCO – United Nations Educational, Scientific and Cultural Organization
USA – United States of America
USAID – United Nations Agency for International Development
W-GCTA – Watson-Glaser Critical Thinking Appraisal
ZPD – Zone of Proximal Development
Abstract

Explicit metacognitive instruction is hypothesised to have positive consequences for the cognitive processing skills of learners, resulting in improved academic performance. Such instruction is likely to be beneficial across the curriculum, but particularly for reading, as low literacy levels are reported in South Africa. A paradigm shift in instruction appears necessary to enhance the current literacy levels in South African schools. This study examined the impact of a Cognitive Enrichment Advantage (CEA), metacognitive intervention on reading comprehension in 83 Grade six learners in two mainstream government schools in Gauteng. Its theoretical and conceptual basis was informed by Vygotsky’s theory of the Zone of Proximal Development and Feuerstein’s theory of Structural Cognitive Modifiability. The study utilised a pre-and post-test, mixed methods, quasi-experimental and cross-lagged research design. The metacognitive intervention was presented to two groups within the experimental school, each with 28 learners, who received the intervention over two phases in the school year (Group one in Term 1 and Group 2 in Term 2). The control school received only regular classroom teaching and served as a comparison against which the experimental school could be measured. Standardised quantitative data was collected from the Cognitive Assessment System (CAS) and the Joint Education Trust (JET) reading comprehension test. Qualitative data was collected from semi-structured interviews, sentence completion tasks, focus groups and feedback from the teacher and parents, pre- and post-intervention. The results indicated that the learners in the experimental school did not show any statistically significant differences in their reading comprehension or CAS scores following the intervention, when compared to the control school. However, the qualitative data revealed increased awareness of the effects of the metacognitive instruction on reading in particular and on learning in general. The intervention also provided opportunities for the learners to reflect on their thinking processes through group discussions, as well as individual tasks. Transfer of skills taught in the intervention could not be confirmed, as post-test results may reflect application when assessed immediately following the intervention, but may not necessarily indicate precise or sustained transfer. Nevertheless, increased learner, parent and teacher metacognitive awareness was evident in the qualitative responses following the intervention and this provides an indication for how educational pedagogy in South Africa could be adjusted. Metacognitive instruction promotes reflection, evaluation and monitoring of thinking and learning processes which may not be observed on the quantitative measures over the duration of this study, but may need a longer period to become consolidated and transfer to other areas. This study contributed to the knowledge base regarding cognitive education, by demonstrating the qualitative value of explicit metacognitive instruction in reading comprehension.
“Children’s cognitive development is an apprenticeship, which occurs through guided participation in social activity with companions who support and stretch children’s understanding and skill in using cultural tools.”

Barbara Rogoff, 1990, p. vii

1.1 Introduction

Metacognitive and cognitive education has been examined since the 1970s. In the quote above, Rogoff (1990) describes cognitive development as a process occurring in relation to others through guidance in a social context. Metacognition, defined by Flavell (1977) as thinking about one’s thinking, has influenced educational policies to a greater extent in some circles internationally, and to a lesser extent locally, but it has definite underpinnings in the education system adopted in South Africa since 1994. Despite this, it has had little or insufficiently reported impact on implementation within the classroom. Hence it can be assumed that metacognitive instruction remains a theoretical construct and has not translated into explicit practice, and thus metacognitive instruction has not transformed education effectively as expected, for the 21st century, especially in South Africa.

There may be several explanations for this, including teachers who may have less than adequate understanding of metacognitive or cognitive instruction, and prefer to continue using familiar traditional methods. Furthermore, teachers and therapists often assume that metacognition and cognitive skills in learners are established and do not need explicit instruction in teaching practice. Metacognition has also been referred to as being too theoretical and therefore difficult to integrate with practice. Garton (2004) states that to describe how children learn to think and how they use their thinking to learn is a complex and difficult process to analyse. Moreover, thinking is not always possible to describe precisely, as reflective thinking is a dynamic process, which is influenced by stimuli, the environment and the individuals in a particular interaction. Metacognitive instruction is a demanding process of active cognition, and may require more time and effort in instruction, as well as sufficient rehearsal and practice in learning for effective and sustained transfer of skills to take place. Defining metacognition and related concepts linked to the process would assist in presenting a clearer understanding of its meaning, and this is presented briefly in this chapter and in greater depth in the subsequent chapters.
Several studies on metacognitive instruction and content enhancement have been carried out internationally, where improved performance has been evident in mathematics, reading comprehension and problem-solving tasks (Cormier, Carlson & Das, 1990; Gajria, Jitendra, Sood & Sacks, 2007; Haddad, Garcia, Naglieri, Grimbitch, McAndrews & Eubanks, 2003; Naglieri & Johnson, 2000). These studies are analysed in the chapters that follow. However, there is a paucity of theoretical and empirical research in the areas of metacognition, cognition, reading comprehension and instruction in South Africa. While there are several South African studies on methods of teaching and studies on Feuerstein’s instrumental enrichment (FIE) (Feuerstein, Rand, Hoffman & Miller, 1980), no studies indicating an application of metacognitive strategies to enhance reading performance in mainstream schools are evident. Explicit metacognitive instruction in the study reported here is process-orientated and is hypothesised to have an influence on learning, and it could thus be beneficial for all learners, locally and internationally.

This study has an intervention paradigm, which focused on the effects of metacognitive instruction and its impact on reading comprehension in a group of primary school intermediate phase learners. The key element of this research was the metacognitive instruction based on the Cognitive Enrichment Advantage (CEA) programme by Greenberg (2000a), which has been researched internationally and has since been introduced in South Africa. The CEA programme and the intervention procedure and process are detailed in chapter 6. As an intervention is a dynamic process, its effects or effectiveness on the process of learning requires some discussion. The concept of evidence-based practice (EBP) is also argued for, as intervention paradigms need to be evaluated in terms of their process and outcomes. This is applicable to the current study as the anticipated and the unlikely outcomes of the intervention are related to the processes involved in the metacognitive instruction implemented, and this needs to be examined so that therapists and teachers can be informed of strategies when making choices in classroom interventions.

The significance of EBP cannot be underestimated, as it reflects acceptable procedures in the field of practice. Evidence-based practice was conceptualised as early as in the 19th century and has been widely discussed in the fields of health professions, such as nursing, dentistry and medicine, but has recently also gained considerable attention in the areas of psychology, social work and education. More recently, however, inclusion of EBP in the field of
communication development and disorders has become more wide-spread. Even though there have been numerous discussions on procedures and practices of EBP, it has not become a customary part of clinical practice (Brackenbury, Burroughs & Hewitt, 2008). There are several reasons why this has happened, and which are discussed in the EBP literature. Some of the more common reasons for this may include a time factor and the access to sources. Nevertheless, EBP allows intervention measures an opportunity to be evaluated and reflected on in order for best practice models to emerge. Research in practice formulates and tests theories of the processes that underlie learning, understanding and information processing, thereby providing clinical and theoretical significance. The concept of EBP and its implications within cognitive education are explored, thereby defining EBP and how best to report evidence from intervention research. This would provide insight for clinicians and teachers, promoting its application. In order for best practice of evidence-based research to occur, integration of experience with research, relevance of programme and context, rigorous data collection, analysis and theory all need to be considered and are explained next in relation to the current study.

Sackett, Rosenberg, Gray, Haynes and Richardson (1996) define EBP as being a "conscientious, explicit and judicious use of current best evidence in making decisions about care of individuals. The practice means integrating individual clinical expertise with the best available external clinical expertise from systematic research" (p. 71). This articulates with the intervention in this study, as the interventionist, a speech-language therapist by profession, integrated her expertise in mediation with the CEA metacognitive instruction programme. Brackenbury et al. (2008) state that the type of evidence rated highly for its rigorous scientific methods in some research may not necessarily be best practice for another situation and may not answer the clinical question on hand. It is important then to look at the results of metacognitive and cognitive programmes selected for learners and to understand the implications of their implementation within a particular context, as reflection on the thinking and learning processes are influenced by their frame of reference or knowledge base (Hyerle, 2011). In the case of the current study, the question of how metacognitive instruction may influence reading comprehension, the interventionist, the teacher and learners within the intermediate phase, were considered.

Furthermore, the question of whether EBP should be theoretically-based arises, and researchers and practitioners understand that practices and procedures that can be researched
need to have theoretical foundations. Therefore this study is grounded in the sound theoretical underpinnings of Piaget, Vygotsky, Feuerstein and the PASS theory of Das, Naglieri and Kirby (1994). These theories and theorists are expanded on in chapter 3. Evidence-based practice grounded in theory will inform clinicians and teachers that a “recipe approach” is not being advocated and that they may select and apply the principles suggested according to the needs of their learners and their particular context of application. The EBP model should include both evidence that has been effective, as well as evidence that has not indicated effectiveness, as each contributes to an understanding of best methods of practice. The extent of efficacy must also be considered in the context of the study and its methodology. The appropriateness of the use of the terms “efficacy” or “effectiveness” as concepts, when discussing treatment, is indicated in the EBP literature. Montgomery (1994 cited in Schiavetti & Metz, 2002) distinguishes between “efficacy” and “effectiveness” and states that “efficacy” refers to probability of benefit under ideal conditions, whereas “effectiveness” refers to results of procedures applied in ordinary or everyday practice.

In addition, EBP or action research is essential for testing the effectiveness of procedures so that the outcomes for learners are ultimately relevant. It is hypothesised that the current intervention study will have clinical and theoretical relevance for South African education, where best practice of metacognitive instruction for effective learning and literacy development is the objective. In addition, the type of instruction used in classrooms needs to be examined in greater detail as there is little information available regarding its influence. Ratner (2006) states: “Bridging between research evidence and clinical practice may require us to confront potentially difficult issues and establish thoughtful dialogue about best practices to fostering EBP itself” (p. 257).

The purpose of this study therefore was to explore the effectiveness of metacognitive instruction on reading comprehension, as well as its association with cognitive processing. The importance of best practice models reinforces the need for reporting and evaluating evidence in the area of metacognitive instruction in the classroom, especially in South Africa. In addition, the significance of this study is examined and justified in this chapter. To achieve the main aim, the researcher implemented an intervention phase for two groups of learners in the intermediate phase at the experimental school. The process of learning was emphasised in the metacognitive intervention programme, where the learners focused on the “how” (process) and not just the “what” (content) of learning. It is hypothesised that when learners
apply metacognitive strategies, they can be effective in comprehending text. This may accelerate the progression of learners, especially as metacognitive skills enable learners to engage effectively with the curricular demands of the intermediate phase of education, when developing literacy skills. This is particularly important at this level as more abstract language and expository texts are introduced. The intervention has its underpinnings in the theory of the mediated learning experience (MLE) (Feuerstein, 1979; Feuerstein et al., 1980), social construction of knowledge and the ZPD (Vygotsky, 1934/1987). This confirms the need for EBP to be theoretically grounded. To realise this further, the Cognitive Enrichment Advantage (CEA) programme was used (Greenberg, 2000a). The study, however, did not evaluate the programme per se but rather examined the process of mediation and its effects on learning.

1.2 Organisation of the Thesis

The chapters that follow discuss the theoretical principles and related studies in order to set the context for this study. A brief description of each chapter is presented to provide a basic understanding of the concepts, building towards an overview of the key variables involved. The main concepts are discussed as follows: educational context in South Africa in chapter 2, cognition and cognitive theories including literacy and language in chapter 3, teaching (instruction) and learning in chapter 4, and metacognitive intervention and CEA in chapter 5. This is followed by the method in chapter 6, results in chapter 7, discussion and conclusion in chapter 8 and chapter 9, respectively.

Chapter 2
The low literacy levels reported among learners in South African schools, in addition to the premise of cognitive modifiability, motivated this study. Metacognitive intervention was selected to influence the literacy achievements of learners, as the importance of literacy for academic success is well documented in the literature. The context of this study is presented, developing a representation of education and reading as it is viewed globally, in sub-Saharan Africa. There is also some focus on South African education in the pre- and post-apartheid period. The chapter includes a discussion on curriculum C2005 and outcomes-based education (OBE), since these systems were in operation in the Department of Education (DoE) at the time of the study. Changes to the education system are being currently proposed.
Chapter 3
This chapter examines the underlying cognitive theories that influence the metacognitive intervention implemented in the present study. Cognitive theorists including Piaget, Vygotsky and Feuerstein are presented in relation to education. Furthermore, cognitive processing as described by Das and colleagues in the PASS theory is examined. The concepts of social learning paradigms, cognition and their links to language and literacy are explored.

**Social learning paradigms**
Social learning paradigms are foundational for effective interactive learning, which reflect the essential skill of pragmatics. This refers to how the learners use their language and learning in social interactions (Norris, 1998). Pragmatics thus has major implications for knowledge construction and learning in the classroom. Interactive and participatory learning contexts provide an opportunity for understanding cognitive development of learners where inductive learning can be practised and revised. Vygotsky, unlike Piaget, saw cognitive development as occurring with others, and within a social and cultural context. For Vygotsky, cognitive development occurred at two levels. The first level is the exchange within a social interaction (interpersonal), and the second level occurs within the individual (intrapersonal), where the individual internalises the learning, making it their own (Vygotsky, 1934/1987). The learning, once internalised, results in cognitive development in the individual (Haywood, 1977). Some critics say that it is difficult to distinguish between the child and the knowledge of the adult in Vygotsky’s theory, and that the notion of scaffolding provided by adults is also seen by others as one-sided. Rogoff (1990) therefore uses the term “guided participation” as it may be the term “scaffolding” which is creating the confusion. Guided participation characterises the social embodiment of knowledge, specifically instructional communication between the more knowledgeable other and the child. Vygotskian theory examines instruction in terms of teaching and learning. Therefore, guided participation acknowledges the contribution of both the teacher and the learner in the interchange, and this is what was promoted in this study.

Opportunities for learning require the participants in the learning process to adjust their roles and responsibilities to meet the levels of understanding of the other person and to contribute to changing the understanding (Garton, 2004, p. 35). From a socio-cultural perspective, the development of knowledge comes from participation in a shared activity, as knowledge
construction is dynamic, arising from a consequence of cognitive transformation resulting from the interaction (Rogoff, 1990). Furthermore, it is through social interaction that the students’ metacognitive capacity is cultivated, as sharing of the individual’s thoughts on a given subject allows that individual’s cognition to be made known to others (Martinez, 2006). Greenberg (2005a) refers to this as “interdependency” (p. 25). Teachers within an educational context have the opportunity to serve as mediators in this learning-to-learn process. They can guide learners in monitoring and self-regulating their thoughts and actions, as well as developing enquiry and mediating meaning (Hay, 2000). It is through effective mediation that children develop their cognitive processes and through modelling of metacognition that they learn to self-regulate their learning styles. Schools therefore need to encourage their teachers to promote skills of effective mediation and to not only focus on the achievement of content. According to Haywood (1977), a balance between content (product) and mediation (process) must be attained for effective learning.

*Cognition and language*

Cognition and language are skills which influence each others’ development, and are presumed to be in place when a child enters school. Vygotsky (1978) indicated that language is critical, as it has an activating, social and instructional function, which assists individuals in planning and organising their learning. An individual’s ability to verbalise and reflect on their thinking, makes what is implicit explicit, resulting in enhanced learning. Language allows children to interact socially with adults who encourage them to master activities, which in turn develops their cognition (Berk, 2003). When children use “self-talk” and later inner speech to regulate their thoughts and actions, it forms the foundation for higher cognitive processes. In addition to language and cognition, there is “perspective taking”, which refers to considering the other person’s point of view in any situation (Owens, 2010). This pragmatic skill is necessary for effective communication, and influences the social interaction for cognitive growth. The importance of language in cognitive development is constantly highlighted in Vygotsky’s work. This study also encouraged dialogue and verbalisation in the intervention because this lead to clarification of thought resulting in construction of knowledge thereby enhancing cognition.

*Literacy and education*

Reading and writing are complex processes requiring oral language, metalinguistic skills, metacognitive and cognitive processing (Owens, 2005). Reading is a fundamental and critical
skill necessary for learners to acquire information and achieve academically (Cromley & Azevedo, 2007). According to Gajria et al. (2007), learners in the foundation phase (Grades 1-3) “learn to read”, but with the changing demands in the curriculum in the intermediate phase (Grades 4-6) they are then required to “read to learn”. These learners progress through the grades, becoming increasingly more dependent on learning from text, which is reliant on comprehension of the material read (Kim, Vaughn, Klinger, Woodruff, Reutebuch & Kouzekanani, 2006). Although fewer studies have focused on comprehension in comparison to decoding, it is generally agreed that the ultimate goal of reading is to gain meaning from the text (Gajria et al., 2007; Kim et al., 2006). Effective cognitive processing is thus fundamental to understanding text. Those learners who are successful at making meaning are able to monitor their understanding, use various strategies to better comprehend the text and problem-solve their tasks in all contexts of learning.

To achieve effective understanding of material that has been read, learners are required to apply their knowledge of strategies so that they are more actively engaged with textual material. This assumes that strategies for better comprehension are introduced in either their classroom instruction or other learning environments, as well as through self-discovery. The acquisition and application of strategic knowledge is also reflective of the learners’ cognitive abilities. Methods of instruction, specifically the type of strategies conveyed, and the cognitive processing of the learners, all need to be examined as alternative techniques may be indicated. The instruction for reading within South African schools provides some context for understanding literacy development of the Grade six learners in this study. The type of instruction for learning is essential so that learners can maximise their knowledge. The focus of this study therefore was on introducing metacognition, which reflects process-based strategies, while engaging the context of reading. As literacy is fundamental to learning, promoting a metacognitive interface with the text is hypothesised to be an effective strategy to develop and enhance reading comprehension. Haddad et al. (2003) indicate that when learners are introduced to metacognitive strategies at the appropriate cognitive developmental level, they are able to engage in abstract thinking, resulting in improved reading comprehension. Metacognitive instruction may allow learners effective application and transfer of strategies when approaching novel tasks, making them more independent learners as well as interdependent learners, in which case they will be able to learn from their peers through social interaction.
With literacy being the foundation for new learning in higher grades, any method to enhance this skill should be explored. Metacognitive instruction to improve comprehension is vital, as learners will then understand the process, and not only focus on the content when reading to acquire information. When process is the focus, generalisation of skill is hypothesised to be more effective. Learners can then be developed into effective independent scholars, successful in problem-solving, which may influence learning in other areas of the classroom. Furthermore, the learners may move to a higher level of learning when appropriately mediated and challenging tasks are encountered, as they will progress to higher levels within their ZPD. Metacognitive instruction may prove to be essential to accelerate the progression of learners and to accommodate the two issues of change: curricular demands in the intermediate phase of education, and any language differences that some learners may experience. In this way metacognitive instruction may benefit all learners in their scholastic achievements.

Chapter 4

The ethos of the classroom environment allows for social construction of knowledge through mediated learning, where the more knowledgeable other intentionally establishes meaning as well as transference. The importance of instruction and learning within the context of the classroom is thus explored in this chapter. Vygotsky’s (1978) contribution of the zone of proximal development (ZPD) has informed education about achievement in learning, including what the learner can gain independently, as well as with assistance. He argued that this zone is of utmost importance as it indicates the direction in which future learning will proceed. Vygotsky (1978) stated that explicit classroom instruction creates a ZPD for a learner. This has important implications for teachers and the teaching materials selected, as they should not only tap into memory, but also into deductive and inductive reasoning and problem-solving. Instruction, according to Vygotsky, awakens a series of functions that are in a stage of maturation, lying in the ZPD. Additionally, the ZPD has implications for assessment and intervention in learning. Metacognition is implicit in educational pedagogy but is not explicit in instruction within the classroom. Although teachers have a certain degree of understanding of the concept of metacognition, they often do not transfer this understanding into their interaction with the learners (van der Walt & Maree, 2007). “Students should know the meaning and the importance of metacognition and the development of the capacity, and it ought to be an explicit goal for both teacher and student” (Martinez, 2006, p. 700).
Instruction, as described by Vygotsky, is at the heart of learning development and he defined learning as the “capacity to learn through instruction” (Wood, 1995, p. 9). It is thus essential to thoroughly examine literacy and learning levels to ensure effective development in South African schools. This study thus focused on metacognitive instruction, where learners reflected on their application of learning strategies and how these related to their reading comprehension activities. A learner’s response to instruction is, however, related to their cognitive characteristics. Naglieri (1989) maintains that cognitive processing abilities are not accurately represented by traditional intelligence quotient (IQ) measures. This may be especially relevant for learners whose IQ may be tested based on measures that require first-language skills and do not reflect their potential to learn. Das et al. (1994) presented an alternative conceptualisation of cognitive processing in their PASS theory (planning, attention, simultaneous and successive processing), operationalised in the Cognitive Assessment System (CAS) (Naglieri & Das, 1997a). This conceptualisation of cognitive processing and its relationship to metacognitive instruction and reading comprehension are examined in this study.

Chapter 5

In terms of the literature, there is no precise definition of metacognition, and metacognition is merely described as reflection of thought processes which involve a complex process. Chapter 5 explores metacognition in terms of instruction and assessment to provide an understanding of this thinking process, which is foundational for effective learning. Flavell (1987) suggests that metacognitive and cognitive strategies cannot be separated as they have a common knowledge base, and the distinction lies in only how the information is used. For this study metacognition is mainly referred to in the thesis, but cognitive strategies are also implied. Flavell (1977), and Jacobs and Paris (1987) define metacognition as “thinking about one’s thinking”. It also refers to monitoring and evaluating the thought processes, which implies active engagement of the mental functions. According to Jacobs and Paris (1987), metacognition refers to three types of knowledge. Firstly, there is declarative knowledge, which is about knowing what strategy to use in a given situation. Secondly, there is procedural knowledge, which refers to how a strategy is applied effectively; and thirdly there is conditional knowledge, i.e. knowing the purpose of a strategy and when to employ it.

Flavell (1987) states that metacognition also involves metacognitive knowledge - how learners think about managing a task, and metacognitive experience, which implies the affect
related to the task. Cognitive strategies, on the other hand, assist the individual to reach the goals set; however, it is the metacognitive strategies which allow for reflection of thought regarding how the goal is to be achieved, and if it has not, analysing why it has not been achieved and considering possible alternatives. Metacognition is also implied when the individual is aware of how they process, store and retrieve information, as well as consciously making the effort to identify relationships in that information. Metacognition is therefore only inferred if “reflection” is indicated. According to Livingston (1997), metacognition assists individuals to benefit from cognitive instruction, resulting in better approaches to learning experiences.

**Metacognitive instruction**

According to Hay (2000), learners’ thinking and learning processes can improve with explicit instruction. The explicit instruction to develop metacognition is reflective of mediational strategies that a more knowledgeable other brings to the interaction, and was alluded to by Vygotsky (1978). Feuerstein introduced the term “mediation”, which refers to a more knowledgeable other as having an intention and framing the information, creating and maintaining a rapport with the child, unlocking the meaning through questioning and explaining, as well as assisting the child to link current learning with real-life situations so that transfer of skills and knowledge to novel learning situations is indicated (Feuerstein et al., 1980; Gredler & Shields, 2004). According to Vygotsky (1934/1987), the process of learning is figured out by the child in collaboration with the adult who is involved in instruction; thus through mediation knowledge is constructed, resulting in learning and development. Word meaning, which implies the importance of language to cognition, is the link in the social interaction between the adult and child.

This use of language between the adult and the child is also implied in Borkowski’s (1992) good strategy instruction, which involves guided discovery or scaffolding. Competence in the learner increases when the learning is scaffolded or guided, therefore mediation is necessary for effective learning. It is in this interaction that discussion is stimulated, and independent and interdependent learning is discovered. Instruction must encourage the learners to develop strategies because discovery, according to Haywood (2003), allows for ownership and consequently leads to easier generalisability. Metacognitive instruction requires a higher level of cognitive processing than traditional instruction, as a learner has to reflect on the strategies applied, while understanding the cognitive processes involved in that task. It allows learners
to monitor, evaluate and direct their own learning. Older learners, according to Marsha and Camahalan (2006), are reported to be more reflective than younger learners. As children mature, they become more aware of their cognitive capabilities and therefore respond more explicitly. Furthermore, their use of decontextualised language, metacognition and metalinguistic skills should be developed. This assumption supports the choice of participants in the present research, as learners in Grade six may be able to make their knowledge more explicit and reflect on their thinking because their language and cognitive abilities should be better developed at this level.

Metacognition and reading comprehension

Comprehension of the text is an active process of constructing meaning, and both metacognitive and cognitive strategies influence reading. Reading also involves metacognitive knowledge and metacognitive control. Metacognitive knowledge refers to the knowledge the individual has when reading, knowing what the task requires, what the text genre is, and what strategies to use to best approach this task. Strassman (1997) states: “Metacognitive knowledge allows a reader to be effective as an active and strategic learner, resulting in self-monitoring and exercising metacognitive control” (p. 140). The reader selects strategies, depending on where the breakdown in comprehension is occurring. This metacognitive knowledge and control are not always spontaneously applied and may need explicit instruction (Haywood, 1977).

From the arguments indicated in terms of the contextual background in education, the theoretical chapter on cognition and literacy, and the literature reviews on metacognition, it can be seen that the educational transformation proposed and adopted for South Africa since 1994 has strong foundations in Vygotsky’s social learning theory and active participation of learners in constructing knowledge and meaning within a learner-centred environment. The emphasis on the role of the mediator in the mediation process is, however, not clearly defined, which often results in traditional methods being applied in the classroom interactions. The balance between process and product to achieve effective learning is also not always evident. This study therefore attempted to include a balance between process and content in developing metacognitive awareness among the learners.
Chapter 6

The method chapter outlines the primary aims, objectives and the research design applied, and theoretical justifications are included where necessary. The purpose of this research was to investigate a metacognitive instruction on reading comprehension among Grade six learners in the experimental and control schools. Several objectives were also explored, including comparison of the experimental groups, regarding performance in their reading and cognitive processing. In addition, low and high achievers were looked at in the experimental and control schools in terms of the JET and Cognitive Assessment System (CAS) tests (JET, 2005; Naglieri & Das, 1997b). Correlations between the CAS subtests and the JET reading test were examined to determine whether similar cognitive processes are involved. Additionally, the awareness and perceptions of the learners, the teacher and the parents in the experimental school were examined with regard to the metacognitive strategies introduced in the intervention.

To accomplish these aims and objectives, a mixed methods approach was selected which is outlined below.

This approach refers to a combination of both quantitative and qualitative methods of research, including an intersection of “philosophical assumption, strategies of inquiry and specific methods” (Creswell, 2009, p. 5). Creswell (2009) describes mixed methods research as opening doors to multiple methods, different worldviews, different assumptions as well as different forms of data collection and analysis. The quantitative method is primary and the qualitative, a secondary database, provides a supporting role in the process. The qualitative process is embedded in the process as it refers to related yet different questions to the primary aim. The mixing of the data in the interpretation complements and provides an added dimension in understanding the phenomena in the study. A mixed methods approach is applicable in this intervention study as it considers the application and the perception of the participants’ metacognition.

The quantitative approach included a quasi-experimental design, as no true control group or randomisation of participants was involved, and convenient sampling, where naturally formed class groups within the schools were selected (Creswell, 2009). The experimental and control school groups could not be matched, and they are referred to as a non-equivalent
control group (NECG). Pre- and post-testing of both groups was conducted, where the pre-test provided the baseline of all participants before the intervention, controlling for the fact that the two groups may not be comparable or equivalent (Fife-Schaw, 2003). A mixed-subject design - between groups and within groups - was applied (Schiauetti & Metz, 2002). In the between-group design, the control school and the experimental school were compared, and in the within-group design, the two groups within the experimental school were examined; pre-, mid- and post-test.

A qualitative research method was included as an attempt at method triangulation, where multiple methods from qualitative and quantitative (mixed methods approach) sources were analysed to provide convergent evidence, which increases the validity of the study (Kelly, 2007). The data was collected at the site, talking directly to the participants and through structured questionnaires. Triangulation involved multiple sources of data collected through multiple methods including questionnaires, interviews, focus groups and sentence completion activities.

A cross-over design was applied, referring to the intervention paradigm. Rosnow and Rosenthal (2002) state that a cross-over approach is used with within-subject designs and may also be referred to as a cross-lagged design. The sample in the experimental school can be described as “crossed” because of treatment conditions, where group one received the intervention in the first half of the year, and group two in the second half of the school year.

The participants were placed into two groups, with a final total of 83 Grade six learners - 44 in the experimental school and 39 in the control school, from the intermediate phase mainstream education. This is in comparison to the original 117 learners anticipated and the reason for the attrition of participants is discussed in the method chapter. Males and females, as well as first-language and second-language English speakers were included.

Measures for quantitative data and qualitative data were administered in this study. A description of the measures and the implications for internal reliability and validity were considered.

Descriptive and inferential statistics were selected based on the assumptions for normality of data. Reliability of measures, to assess internal consistency between items, was completed.
Inductive data analysis, as well as content and thematic content analyses, was used to identify patterns and themes in the qualitative data. Interpretative inquiry was applied maintaining both the participant’s perspective of issues and the researcher’s interpretation so that a more holistic perspective could be achieved (Creswell, 2009; Terre Blanche, Kelly & Durrheim, 2007).

In order to meet the requirements of the Humanities Ethics Committee of the University of Witwatersrand, consent was obtained from the relevant Department of Education (DoE), principals of the selected schools, teachers and parents/guardians, as well as from the participants. Ethics protocol number H071003 was assigned for this study.

Chapter 7

The results of the quantitative and qualitative data are presented separately in this chapter to highlight the findings of each method, providing an easier understanding of the outcomes. The results are also presented in line with the research questions to provide a flow in organisation.

Chapter 8

The discussion chapter provides an integration of the findings, as the key to a mixed method approach lies in the integration of the outcomes so that interpretation is viewed more broadly than merely drawing inferences from the data from any one approach.

Chapter 9

The conclusion chapter looks at the focus of the study, highlighting the study’s contribution to knowledge, based on the evidence, underlying theory and implications. Methodological, theoretical and clinical implications are considered, as well as the limitations of the study, and suggestions for future research are made.

1.3 Anticipated Significance of the Study

Evidence-based practice (EBP), as discussed, is essential in intervention paradigms so that best practice models can emerge. The results from this study include statistically significant and non-significant outcomes, and trends in the qualitative data, which can inform therapists
and teachers of explicit methodologies and intervention procedures in metacognitive instruction. In addition, metacognitive instruction has pedagogical consequences for the learner and the teacher, and also has implications for applying education principles in the South African Education Department, as expressed in the revised national curriculum statement (RNCS) (DoE: RNCS, 1997, 2000, 2008). Metacognitive instruction has implications for enhanced literacy and learning, which are fundamental for social and economic development, and retention of learners, especially females in schools (UNESCO Report, 2005). Additionally, metacognitive instruction will improve reading comprehension skills and, by implication, scholastic success, which will result in improved self-esteem and more competent readers and literate individuals in society. This promotes the domino effect of accessing continued education and encouraging literate families. This type of instruction also develops learners into strategic thinkers, who should be aware of how they think: reflecting, evaluating and monitoring their thoughts so that they can be effective problem-solvers. Finally, cognitive processes, as measured by the CAS (Naglicri & Das, 1997a) can be examined in relationship to the continuing assessment system, and the current curriculum operational in South African schools. This should allow the teacher a better understanding of a learner’s cognitive processing and resultant performance. As a result, the teacher can then suggest appropriate instruction and intervention, such as the application of the aptitude treatment interaction (ATI) (Haddad et al., 2003), which refers to an intervention that is related to the individual’s aptitude.

1.4 Conclusion

This study therefore has both theoretical and practical (clinical) contributions to make towards the body of knowledge, and is relevant in South African as well as international contexts. At a theoretical level, the mixed methods approach and the cross-over design relating to the intervention have implications for data collection in intervention paradigms. Furthermore, analysing and interpreting outcomes regarding immediate and delayed post-intervention linked to the cross-over design provides an understanding of the concept of transfer of skills. Moreover, the correlations between the JET reading and the CAS tests have implications for the assessment system in South African education. Finally, this study contributes towards EBP, informing teachers and therapists of the theories, methodologies and outcomes, which can impact on future practice.
At a practical level, a focused and explicit application of metacognitive instruction in the classroom should allow all learners to access their cognitive skills, preventing scholastic failure. Metacognitive instruction provides opportunities for learners to reflect on and verbalise their thoughts for clarification, creating an awareness of their cognition. The group interactions promote varied perspectives among learners; and through discussions, dialogues and debates the learners apply pragmatic skills that are essential for academic success. The active interactions of both the teacher and the learners in constructing knowledge, places teachers and learners in the forefront of instruction and learning, which is foundational in progressive education models. Greenberg (2005a) indicates that learners should develop both independently as well as interdependently, appreciating diverse perspectives from collaborative learning contexts. This study therefore has implications for explicit instruction in metacognition, making what the DoE indicates as implicit in their policies and procedures, explicit in the South African classroom practice.
"Creating literate environments and societies is essential for achieving goals of eradicating poverty, reducing child mortality, curbing population growth, achieving gender equality and ensuring sustainable development, peace and democracy."

Koichiro Masuura, 2005, p.5

2.1 Introduction

The fundamental role that education plays in human achievements cannot be underestimated, as indicated by Masuura (2005) in the quote above. For learners to succeed in this globalised economy and be classified as global citizens, education is the key. “In today’s era of globalisation, economic growth depends increasingly on an educated workforce that is poised to take advantage of opportunities” (USAID, 2004, p.2). Education is also fundamental in any country for sustaining democracy, improving health, increasing income and managing environmental resources effectively. Furthermore, education is a basic human right and not having the basic literacy skills is not only morally indefensible but it is also an appalling loss of untapped human potential and economic capacity, and development (EFA: UNESCO Report, 2005).

This chapter presents the educational context and assesses the status of education from a global perspective, including sub-Saharan Africa and specifically linking it to the South African context. In addition, the curriculum (C2005) selected and the methodology of its application are explained. The developments in education, particularly with regard to literacy, are explored in order to provide a better understanding of the literacy status within the South African context. Knowledge of developments in education is essential as the implications of this study can only be appreciated within this context. This chapter therefore provides the contextual framework for this study on metacognitive intervention.

2.2 Status of Education in the Global Context

Education as a basic human right is a global concern. The provision of basic education, specifically literacy skills, has a significant influence on individuals, societies and the world
in general. Individuals who are literate promote education in their families, encouraging them to make the most out of the opportunities that they encounter. They have access to continuing education resulting in them being life-long learners. Moreover, educated individuals add to the economy and form societies that can deal with changing global issues in a rational way. Delors (1996) argues that education promotes knowledge and is a life-long process, as individuals live and engage in a dynamic world, adapting to advancing technology. Education is also part of an intellectual revolution that drives the economy but this should not be achieved at the expense of human needs or the physical environment. The United Nations therefore set up a commission to monitor and guide educational issues across the world with special emphasis on developing countries. Objectives have been set to promote literacy since literacy forms the core for education for all (EFA) (UNESCO Report, 2005).

UNESCO’s education premise encourages literacy development as part of a more holistic human rights concept so that culture, citizenship, social cohesion and research are also developed. Life-long learning means receiving basic schooling and continuing education; it encourages individuals and society to be responsible for setting and achieving goals, developing independence and interdependence, and making sound judgements. Due to the rapid transformation in technology and the global market, continued up-grading and up-skilling of individuals are required to meet the changing needs. Education is also seen as the “key to the 21st century [italics added], as it will meet the challenges of a rapidly changing world and this is necessary because of its advantage of flexibility, diversity and availability at different times and different places” (Delors, 1996, p.4). Furthermore, the UNESCO commission stated that the opportunities that are encountered cannot be maximised if basic education is not in place (UNESCO Report, 2005).

A solid grounding in basic education promotes access to literacy, which in turn has a domino effect on individuals and on society. A literate individual will encourage literacy development in their family, literate people have access to continuing education and literate societies are said to deal with challenges more effectively (EFA, UNESCO Report, 2005). Literacy as a concept is more complex than just being able to read, and it has been defined and conceptualised in many different ways and thus there is no standard definition for literacy. UNESCO, however, defines functional literacy as follows:

“a person who is functionally literate can engage in all those activities in which literacy is required for effective functioning of his group and community, and also for
enabling him to continue to use reading, writing and calculation for his own and the community's development" (UNESCO, 1978).

Additionally, literacy refers to more than the individual, and involves both contextual and social development. A fifth of the world's adult population is reported as illiterate, with the majority coming from developing countries and a major portion being women (UNESCO Report, 2005). Countries implicated here are south and west Asia, sub-Saharan Africa and the Arab States. The UNESCO Report (2005) indicates that a strong correlation exists between literacy levels and poverty, both economically and with regard to capacity. Increasing opportunities for literacy skills impact on the capabilities of individuals, families and communities accessing health, education, political, economic, cultural and gender opportunities, and services (EFA, UNESCO Report, 2005). Furthermore, factors such as age, gender, geographical differences and socio-economic issues also impact on literacy rates. It is also important to consider groups which due to complex social, cultural and political reasons may exclude some individuals from mainstream society. Countries that place ethnicity, religion and caste systems above human rights issues have added to the literacy challenge across the world (EFA, UNESCO Report, 2005).

Developing countries throughout the world therefore seem to experience similar educational challenges. Resources for basic education are reportedly increasing, and public spending on education is rising. At the G-8 Summit in Gleneagles in July 2005 and the United Nations World summit in New York in September 2005 the international community pledged to increase its financial support for developing countries, specifically for sub-Saharan Africa (UNESCO Report, 2005). Ever since the 1970s the World Bank has been funding education in developing countries as they believe that basic education boosts productivity and technological transfer, leading to improved economic growth (Bollag, 2004). The United Nations has declared the years 2003-2012 as the Literacy Decade (Harrop, 2003). In addition, the United Nations has adopted the Millennium Development Goals for all countries. This has set in place time-bound and measurable goals as well as targets designed to decrease poverty, hunger, disease, illiteracy and environmental devastation and discrimination against women (Millennium Development Goals report, 2010).
2.3 Education in Sub-Saharan Africa

The challenges discussed in the UNESCO Report (2005) are evident in sub-Saharan Africa. According to the UN University Project Report (2008), challenges identified in this region, in addition to health and economic issues, include retention of learners, access to education, resources, capacity and quality of education. These affect the achievement of the goals set for education.

The UNESCO report (2005) stated that six countries in eastern and southern Africa have lower literacy rates among 15- to 24-year-olds than in the 25- to 34-year-old age range. This was due to political and economic turmoil in these countries. Drop-out rates in schools in unrest areas are reported to be increasing. This report indicates further that formal schooling is the one avenue that can curb low levels of literacy as well as maintain retention in schools (UNESCO, 2005). Achieving the goals set by EFA and Millennium Goals continues to be a challenge for many countries in Africa. As at 2007, the United Nations report indicated that a large percentage of children were not accessing primary school education. Some of the reasons for this include poverty, health, economic and environmental issues, population, teacher training and limited resources (UN University Project Report, 2008). In many instances it was observed that the secondary and tertiary institutions reflected the difficulties experienced in the primary schools. Many young people are said to be leaving their countries to seek better opportunities abroad, adding to the brain drain (Mooko, Tabulawa, Maruatona & Koosimile, 2008), impacting on the country’s economy. Mooko et al. (2008) stated that many African countries, following their independence from colonial rule, focused on developing their political and economic resources instead of their education systems.

In order to achieve some of the UN’s EFA goals, many countries in Africa adopted the basic goal of a free education policy for the primary level. This goal was set at the expense of quality education. Many of the primary schools were registering new learners even though they clearly didn’t have the capacity or resources to deal with the overwhelming demand for primary school education. Christie (1999) described this as a misalignment between visionary and symbolic nature of policies, and the contextual constraints which impact on implementation (this is discussed in more detail later). Countries including Botswana, Zambia and Ghana had to provide additional finances to cover all the costs related to education such as textbooks, uniforms and meals (Mooko et al., 2008). Provision of early
education was another goal, yet by 1997 only 27% of the 3- to 6-year-olds were receiving early education. Most of the children in this group came from urban areas where caregivers could afford it. Nevertheless, the governments in the Seychelles and Mauritius were said to be providing early education where 85 and 94% of children respectively were receiving education by 2007 (Mooko et al., 2008). Gender parity was also a goal and according to the International Council for Adult Education (ICAE), gender parity was reported in countries including Zambia, South Africa, Lesotho and Botswana (ICAE, 2009).

An added challenge in education is the issue of HIV and Aids. The World Statistics report (2009) indicated that approximately 33.3 million people world-wide are living with HIV and Aids. This pandemic has serious consequences for education and is one of the factors which affect drop-out rates and gender differences. Many reports indicate that female learners in particular leave school to care for the ill and to head households. Furthermore, HIV/Aids is also reported to impact on the workforce, teachers in this case. “The high level of prevalence of HIV and AIDS in a growing number of developing countries, especially in sub-Saharan Africa, is a major factor influencing teacher absenteeism and lack of effectiveness, sometimes leading to high teacher/staff attrition rates” (EFA: UNESCO Report, 2005, p.112). Education has been emphasised as the solution to several health and economic issues. It is thus essential that educational policies and their implementation be prioritised as a way forward.

It is well documented that resources and capacity are limited in sub-Saharan Africa, and as such add to the challenges facing education. Several countries indicate that their budgets for education are insufficient. Rwanda and Kenya presented literacy as a separate budget and focus, in order to source adequate funding. “Countries like Burkina Faso, Botswana, Kenya, Namibia, South Africa, Senegal and Uganda are said to be linking literacy to other national development strategies and education” (Mooko et al., 2008, p.20). Non-governmental organisations (NGOs) also play a key role in working collaboratively with governments on literacy issues. Additionally, international funding including USAID and UNESCO continue to support African countries in promoting basic education (USAID, 2004; UNESCO, 2005).

In addition to the human-related issues discussed above, educational issues of curriculum and language policy have emerged. Curriculum changes have been instituted in countries including South Africa, Zambia and Botswana (Coombe, 2001). Life skills in the curriculum have been prioritised with the aim of equipping learners with skills in decision-making,
problem-solving, effective communication, assertiveness, and conflict resolution. Language policy continues to be a challenge for most countries in Africa. Following colonial rule, many countries adopted European languages as they believed that African languages did not have the same economic power globally and have not been sufficiently developed for educational needs (De Klerk, 2002; Sukhraj, 2005). The use of any particular language does not only have pedagogical implications but is also influenced by parent and political perceptions. As many African countries are donor-funded by European countries, adoption of their languages seems to be the norm. Current language policies, however, are aiming at including African languages in the curriculum. The common issues such as poverty, access, lack of resources, teacher training, poor or limited facilities, retention of learners and quality of education, discussed above, are evident throughout sub-Saharan Africa and continue to prove challenging. As can be seen, education and specifically literacy cannot be viewed in isolation since literacy is affected to a large degree by other human-related factors. This holistic approach is essential in order to ensure any measure of success in promoting literacy in any country. And in fact Fleisch (2008), in his discussion on why South African children underachieve in literacy and numeracy, refers to this important point.

2.4 Education in South Africa

Discussion on educational issues in sub-Saharan Africa largely reflects the South African situation. Several of the challenges facing neighbouring countries are experienced and are reported in the South African literature. The history of education during the apartheid era and the period following democracy are discussed to provide a contextual background to the educational and literacy policies in South Africa, as well as to support the rationale for the current study. The curriculum adopted by the Department of Education (DoE) is also presented as it forms the context and links to the assessment and intervention in this study.

2.4.1 Education: A Human Right

"The human rights approach to education requires recognising education as a fundamental right" (Vally, 2005, p.39). The United Nations Declaration also recognised education as a fundamental human right for the multifaceted development of individuals and society (United Nations, Article 1948, p.26). Furthermore, the Dakar Framework for Action (2000) reiterated that access to quality education was the right of every child. Since democracy in South

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Africa, the Bill of Rights as contained in the Constitution of South Africa (1993, 1996) stipulates that basic education is a right for all. It also indicates that all people should be afforded the opportunity to be educated successfully as educational policies reflect social justice. Madisha (2001), when addressing the South African Democratic Teachers Union (SADTU) conference, indicated that the focus is not just on access but that quality of education also needs to be considered. As is clearly evident from the history of education in South Africa (discussed below), the majority of South Africans did not have access to education for a considerable number of years before 1994. According to Baatjies (2003), “Illiteracy and alliteracy [italics added] in South Africa are deeply rooted social phenomena and are threatening the transformation and development of our nation” (p.1). The Star newspaper (2001) indicated that 1.6 million children who should be attending school are not doing so as a result of a lack of finances. Redressing the lags on issues related to human needs, including poverty, unemployment, food and shelter may have to occur parallel to educational transformation (access to schools, infrastructure, learning materials, unequal curriculum choices, teacher-learner ratio) as they influence each other (Madisha, 2001). In a democratic country like South Africa, human rights issues together with literacy have to be focused on and prioritised in order for transformation to take place. Moreover, the South Africa government needs to consider the importance of quality education to avoid perpetuating the inequalities of the past. Unfortunately many countries in sub-Saharan Africa neglected the issue of quality education in order to meet the goals of providing education to all (Christie, 1999).

2.4.2 Education Status: Apartheid Era

Education during the apartheid era in South Africa was conceptualised around a fragmented system and was constructed on racially segregated lines (Steyn, 1999). The education system was administered by 19 distinct ethnically-based departments: one for each of the four “independent” homelands, one for each of the eight “self-governing” territories, one for African students, three structures for “whites, coloured and Indians” respectively, and a Department of National Education responsible for the broad policy (Taylor & Vinjevold, 2000). In addition, gross inequalities in resources were evident. In 1990, the average of capital expenditure per white student was five times more than that of African students. Some schools in the townships were also better resourced than the schools in rural areas (Taylor & Vinjevold, 2000). There was disparity in “financing of education, on salaries and employment conditions of staff, on professional registration of teachers, and on norms and
standards for syllabi, examinations and the certification of qualifications” (Steyn, 1999, p.66). The management system in place during this era was described as “extreme authoritarianism”, where managers at school were compelled to attend programmes called “Top Down”. The ideological underpinnings and philosophy of these “top down” educational programmes were based on “Fundamental Pedagogies”, a philosophy associated with the University of South Africa and other tertiary institutions, except for the liberal campuses (Higgs, 1997).

Despite the inequalities experienced by the various education departments, increased growth was evident in the school systems between the 1970s and 2000s. This was mainly due to pressure from business and the economy which required a better skilled workforce. Other important factors that played a role were the fact that the apartheid state’s provision of education needed to be legitimised and, most important, black youth placed tremendous political pressure on the government in that period (Taylor & Vinjevold, 2000). Black youth began to mobilise against the inequalities in resources and education policies, which resulted in the Soweto uprisings in 1976. By promoting its ideology the apartheid education department not only set itself up for failure but also provided the foundation for the numerous problems the new dispensation in the democratic government would inherit (Taylor & Vinjevold, 2000). The malfunctioning of the education system was further indicated by poor learner progression. South Africa on the whole was spending a higher budget on education than countries like Turkey, Chile, and Egypt but producing a smaller number of learners who achieved tertiary qualifications (Collings, 1999 cited in Taylor & Vinjevold, 2000).

After the 1994 elections, the new government had to deal with the rapid expansion of schooling. It inherited fragmented resources that were not equally distributed from the previous educational structures, and in addition had to deal with the destabilising effects of resistance (Steyn, 1999; Steyn & Wilkinson, 1998; Taylor & Vinjevold, 2000). Their takeover of this malfunctioning system was greeted by high expectations of its citizens, especially those classified as previously disadvantaged, as well as international critics. The new government was expected to consolidate education, making it accessible, fair and equitable for all South Africans, irrespective of race, ethnicity, creed or class. The new philosophical discourse in education had to redress the legacy of the philosophy of “Fundamental Pedagogies” (Higgs, 1997), and present a new vision of empowered citizens for the future (Steyn & Wilkinson, 1998).
2.4.3 Education Status: Democratic South Africa 1994

For the first time in South Africa's history, a government has the mandate to plan the development of the education and training system for the benefit of the country as a whole and all its people. The challenge the government faces is to create a system that will fulfil the vision to "open the doors of learning and culture to all". The paramount task is to build a just and equitable system which provides good quality education and training to learners young and old throughout the country (White Paper on Education, 1995).

Following the change in government in 1994, the then Minister of Education, Professor Bhengu, embarked on the transformation of the existing education system to align it with the tenets of the constitution. During the first five-year term, that is from 1994 – 1999, three main areas were prioritised. This included “reorganising the 19 apartheid departments of education into a single national department and nine provincial departments, achieving high levels of representation amongst staff at all levels of the system, and establishing a policy framework which embraces a progressive vision for school reform” (Taylor & Vinjevold, 2000, p.171). The policy framework had to be revised from the “Fundamental Pedagogies” of the past to embrace a more progressive vision for the future. According to Higgs (1997), the revision of the philosophy of education discourse had to interact critically with the new dispensation of the South African government. It had to promote a “critical society with a culture of tolerance, enquiry, public debate, and accommodating differences and competing interests” (Higgs, 1997, p.106).

The following official documentation was taken into consideration in the drafting of a new educational policy for South Africa:

- Constitutional rights: All citizens have the right to basic education and equal access to educational institutions (Constitution of the Republic of South Africa, 1993).
- Administration: A more participatory and democratic way of thinking of the role of government in education as well as school staff and communities (Presidential Review Commission, 1998).
Qualifications: The South African Qualifications Authority Act (SAQA) was established to provide a coherent framework, monitor and advise the recognition of all educational qualifications (SAQA, 1997).

School governance: The South African Schools Act promoted the establishment of school governing bodies which permitted parents to exercise authority and responsibility in the governance of schools (Department of Education (DoE, 1996).

School funding: The National Norms and Standards for School Funding established criteria for financing schools, which would redress past imbalances (DoE, 1998).

Curriculum: Several policy documents were created to change the approaches to teaching and learning (DoE, 1996).

Teacher management: Several instruments were set up to align regulations governing teacher qualifications, certification and management, as well as establishing a system for monitoring performance management for teachers (DoE, 1996).

Assessment: Assessment was looked at in relation to the new curriculum (DoE, 1996; RNCS, 2000).

Language: The policy of additive bilingualism encouraged respect for the mother tongue and the 11 official languages (DoE, 1996).

Gender: Gender equality measures were recommended by the Gender Equity Task Team (DoE, 1996).

Based on these policy documents, South African education was on a course towards transformation. Despite the radical changes anticipated, difficulties inherent in the transformation of any process were evident in the new education system in South Africa, which is understandable given its historical developments (Steyn, 1999). Some of these issues play an important role in current policies and situations experienced in schools at present. These issues include an exodus from previously disadvantaged schools to schools that are perceived to be more advantaged, classroom instruction, teacher training and the classroom context (De Klerk, 2002). Some of these challenges are discussed as they have crucial implications for the curriculum adopted by the DoE and its outcomes.

**Increased Exit from Previously Disadvantaged School.**

With the changes in the national education system in South Africa since 1994, there has been an increase in learners with English as an additional language (EAL) into schools with English as the medium of instruction or language of learning and teaching (LoLT). The
movement of children from previously disadvantaged schools to more advantaged schools has been frequently noted in the South African education literature. Additionally, the research conducted under the auspices of the President’s Education Initiative (PEI) (1998), also indicated that the majority of parents and teachers were more in favour of having English as the LoLT (De Klerk, 2002; Vinjevold, 1999). Some of the reasons for this may include migration driven by labour markets, as well as education-driven migration of individuals seeking better access to schooling (Paterson & Kruss, 1998).

Soudien (2004) tried to explain some of the reasons for the immediate exodus from one school to the other after 1994 by engaging with the question of how education contributes to social change in South African education. Race and class issues have also been given as an explanation for the “integration” process. Class issues seem to be replacing race issues in some instances and this creates additional problems of access (Madisha, 2001). The major movement of children from former Department of Education and Training (DET) schools may be related to the history of turbulence within that system, and the perception of parents. Parents of children from former DET schools believed that there was more stability in the educational systems under the former House of Assembly (HoA), House of Delegates (HoD) and the House of Representative (HoR) (Soudien, 2004). In addition, migration took place as a result of an increased awareness of the importance of education, and parents wanted their children to attend better facilities. Parents equated better education with previous “whites only” or “model C” schools, as they were referred to, since such schools were generally better resourced (De Klerk, 2002).

Furthermore, a major shift in the social nature of education, reflecting the upward mobility of the expanding middle class across all sectors of the population is likely to have played an influential role. Improved financial resources within families have allowed them to relocate in terms of work and homes. Some families moved to urban areas as they perceived these environments as more supportive of education and affording better opportunities (Paterson & Kruss, 1998). Since 1994, South Africa has become part of the global village hence parents expect the education system to equip their children with the necessary competencies to develop them into successful and productive citizens (Taylor & Vinjevold, 2000). Transformation therefore did not only take place within the country but also within the world’s economic stage as South Africa became part of the global village.
Instruction within the Classroom.

The critical outcome of this process of integration in South Africa is described as assimilation, where the incoming learner has to conform to the dominant culture within that particular school (Soudien, 2004). Many of these incoming learners have to also engage in English, which may not be their mother tongue. The period of exposure to English does influence their interaction and participation in the classroom. Moreover, the competency of the teacher in the language of instruction is crucial for effective teaching and learning (Taylor & Vinjevold, 2000). The incoming learners also need to adapt to the changing demands in the curriculum in the intermediate phase and language differences may influence their performance.

As Curriculum 2005 (C2005) has its foundations in the theories of Piaget, Vygotsky and Feuerstein on active construction of knowledge, learners are encouraged to actively participate in the learning process (DoE, 1997). This process is only possible if the learners feel competent to share their experiences. Therefore the type of classroom discourse applied is important for this process to be encouraged, and the intervention in this study aimed to promote the context, which allows for active participation of the learners. Anecdotal reports from teachers suggest that many learners appear to be coping with the curriculum. Nevertheless, examining learners’ cognitive processing and classroom instruction, as proposed by the current study, will provide valuable insight into how learning could be further enhanced, assisting in development within the transformed system. Classroom instruction includes therefore not only the medium of instruction but the philosophy of education, as well as the quality of teaching. Classroom instruction is discussed in more detail in chapter four.

Levels of Teacher Training.

Issues with the levels of teacher training were also experienced, and this was reported by the PEI (1998). It was stated that the mindset of teachers had to change where the locus of control had to be internalised so that they were responsible for exercising initiative, shaping and directing what happens in their classrooms and schools. Vinjevold (1999) reported that the knowledge resources of teachers were less than adequate, as they had poor conceptual knowledge of the subjects they taught, as well as not having a good understanding of the theories underlying classroom practice. The most grave observations of the PEI (1998) was that many teachers were unsure whether reading was specified as an outcome of C2005 and
as a result some were not teaching reading as an explicit activity (Taylor & Vinjevold, 2000).
To implement the new curriculum and to improve the quality of teaching in the long term, courses to equip teachers are necessary to develop conceptual knowledge and higher-order skills in all learning areas. Several programmes and suggestions were explored, including reflective practice, where the learners’ perceptions of their learning environment were encouraged. This implied that the roles of both the teacher and the learner had to change to meet the changing needs of the curriculum (Aldridge, Fraser & Sebela, 2004). All of these mentioned issues are critical to the successful application of C2005.

Classroom Context.

It is argued that the classroom context is vitally important as it provides the space where interactions occur. The level of conduciveness will impact on the outcomes of the curriculum. Moreover, the classroom environment is seldom addressed in curriculum development, even though it is pivotal to its application (Sonn, 2000).

According to Vygotsky (1978), the construction of knowledge happens whenever a more knowledgeable person relates to a learner in a guiding context. Some supporters of Vygotsky’s theory query the need for ensuring an optimal classroom context, as it is not necessarily the only place where learning occurs. Nevertheless, the importance of the classroom context should not be underestimated. Moll (2001) argues for a succinct position on this issue as it is vital that changes in education should correspond to the core principles of Vygotsky’s theory. According to Moll (2001, 2010), school environments provide a cognitive consequence, different from any other environment, as the school is where decontextualised learning occurs. School is presented as a more systematised context where the learner engages and develops higher level abstract thinking. Even though other environments may present with decontextualised learning, the school context presents it together with social interaction in a more sustained manner over a longer period of time. Additionally, it provides explicit discipline knowledge necessary for development (Cross, Mungadi & Rouhani, 2002). This supports Vygotsky’s perspective of scientific knowledge acquisition, where Vygotsky indicated that it occurred with explicit instruction, which is evident within formal schooling (Daniels, 2007). In the present study, the classroom context is acknowledged as it influences the instruction provided and impacts on the participation of the learners. For this reason, metacognitive instruction in the classroom, with learners actively engaged, was selected as a means and a context for the intervention. The importance of the classroom context and the
teacher interaction is in line with Vygotsky’s view that the individual and the environment mutually influence and shape each other (van der Veer, 2007). The classroom, as an active learning environment, is further discussed in classroom instruction in subsequent chapters.

These challenges add further strain on the implementation of equitable access to education. Both quantitative issues, including educational budgeting provisions at provincial level, materials, teacher-learner ratio and planning of schools, as well as qualitative issues such as pedagogy and language policy need to be considered in order to achieve basic education for all (Paterson & Kruss, 1998). For the purpose of this study, issues relating to the curriculum, specifically literacy development, language and classroom instruction will be discussed in more depth in the following sections and chapters.

2.5 Curriculum

The transition from an education system inherited from the apartheid years to an education system in an era of democracy involved intensive policy developments in education. Kraak (1999) identified three discourses which influenced the changes in education: peoples’ education discourse, which related to the struggle against apartheid in the mid-80s, systemic discourse between 1980 and 1994, which refers to focus on structural changes in education and training, and the outcomes-based education and training (OBE/T) discourse that has been taking place since 1994. Each of these discourses shaped the development of education but the final outcomes meant that the principles entrenched in the Constitution had to be considered. The discourse also promoted curriculum, pedagogy, assessment and certification. The curriculum was seen as playing a vital role in creating an awareness of relationships between human rights, a healthy environment, social justice and inclusivity (DoE: RNCS, 2002). It is evident from this aspiration that the new South African government wanted to develop learners who would embrace the core values of human rights, while striving to be life-long learners in a global world. Furthermore, this curriculum should promote certain values not just for personal development but should also promote the development of a South African identity that was different from that of the apartheid period (DoE: RNCS, 2002). The curriculum therefore intended to play a major role in linking political, social and educational issues.
The new dispensation in 1994 wanted the curriculum to be understood as being more than just teaching and learning activities that take place in learning institutions. To formulate the curriculum, the South African government introduced the National Qualifications Framework (NQF). The NQF is defined as a coordinating structure and mechanism to address the previously fragmented and unequal system of education (Soudien & Baxen, 1997). According to the DoE (1997), the NQF’s primary objective was to create an integrated national framework for learning achievements that encourages life-long learning. A change in discourse from a systemic discourse, which was a consensual approach to reform and reconstruction, to an OBE/T discourse, which looked at the curriculum, using an outcome-based methodology, culminated in the implementation of a new curriculum, namely, curriculum 2005 (C2005) in 1998 (Kraak, 1999; Waghid, 2001). OBE/T, or OBE as it was referred to, was seen as a global educational curriculum (Cross et al., 2002). Kraak (1999) defined OBE as a multidimensional approach which was more than just achieving outcomes. “OBE was to guarantee success for all; to develop ownership by decentralising curriculum development; to empower learners in learner-centred ethos, and make schools accountable and responsible in ensuring success” (Steyn & Wilkinson, 1998, p.203).

OBE is an educational framework which focused on what is to be learnt, that is, outcomes. The learner would demonstrate and achieve competencies according to the criteria and the performance objectives set, which were referred to as standards. Furthermore, criteria for the assessment of competencies were also formulated (Spady, 1994). This system, unlike norm reference testing, looked at individuals mastering skills according to the performance objectives set. This was reported to be an ideal model for developing individuals when compared to the fragmented education system inherited from the apartheid period (Cross et al., 2002). The system had been applied in several countries including some states in America, Australia and New Zealand, but was, however, a system not without its methodological and assessment controversies. Chisholm (2005) indicated that OBE was an internationally borrowed system but was shaped by South African politics, and it was to link to the dominant discourse of rights, development, social justice and nation-building. OBE, although it may be similar to the international version, differed in that it reflected the South African context in its design and implementation (Chisholm, 2005). As the controversies of OBE are not the main emphasis of this study, it is briefly described and examined in relation to literacy, as it was the methodology in education at the time of this study. The controversies
surrounding the OBE methodology will nevertheless be alluded to as they may relate to the implications of the instruction in this study’s intervention paradigm.

The structure of OBE in South Africa is based on four theoretical philosophies, that is, behaviourism, social reconstructivism, critical theory and pragmatism (Steyn & Wilkinson, 1998). From the behaviourists’ perspective, behaviour is observable and measurable, dependant on stimuli from the environment. Specific outcomes which is a feature of behaviourism, was formulated by the South African Qualifications Authority (SAQA). “Outcomes refer to the specification of what learners are able to do at the end of a learning experience” (DoE, 1996). Social reconstructivism refers to social transformation and the generation of knowledge is seen as a product of social interaction. The DoE (1996) indicated that the learners need to be active participants in formulating knowledge and that learning is facilitated by teachers. Critical theory focuses on the emancipation of society and individuals, and, according to this approach, critical thinking and questioning need to be encouraged to empower individuals. Critical outcomes formulated by SAQA include “collect, analyse, organise and critically evaluate information” (DoE, 1997). The final philosophy embraced by OBE is pragmatism which refers to the usefulness of the theory which is to be put into practice.

In the ensuing debates on OBE, several issues that have arisen include content-based versus process-based approaches (Steyn & Wilkinson, 1998). The four philosophies mentioned earlier are in agreement against a content-based approach to education. Furthermore, the learner-centred approach with the teacher as facilitator is highlighted. Evaluation and assessments are also critical areas that have been emphasised since work aimed at memorisation, rote and content are rejected. Disagreements in the philosophy perspectives suggest that behaviourism and pragmatism are more product-oriented when compared to social reconstructivism and critical theory, which are process-orientated. The evaluation of intrinsic abilities as described by process-orientated philosophies is not easy to assess but needs to be included. According to Steyn and Wilkinson (1998), effective attitudes, which involve a cognitive process, may only be evident in the individual in later years. Furthermore, co-operation and co-construction of meaning which are a part of process-orientated approaches need to be balanced with competitive principles which are evident in product-orientated philosophies. The process of consultation may need to include learner perspectives, especially as learners are being encouraged to think critically about information.
From the examination of OBE, it becomes clear that education is a broader concept, and that the learning principles to develop individuals into independent and interdependent life-long learners must be highlighted. Many of the underlying principles indicated in the philosophies which underpin the system of OBE in South Africa are closely linked to the theories of Vygotsky and Feuerstein. Additionally, OBE is also linked to the overarching view of cognitive education in this study, emphasising learner-centeredness, reflection, questioning and process orientation. However, debates on the pros and cons of OBE have been ongoing, as the intended outcomes of this system were not being fulfilled. The debates are therefore encouraging, as it shifts the old paradigm of passively accepting what is given without question or thought. These debates also promote self-evaluation and insight in learners, parents and teachers. Therefore, for OBE to be implemented effectively, a balance between content and process needs to be achieved. As a result of the debates on this education discourse the present minister of education, Angie Motshekga, decided that immediate changes in education were necessary as all the envisaged and intended outcomes of OBE have not translated into promoting education as expected. The proposed changes on “Action Plan 2014: Towards the realisation of Schooling 2025” are now in the process of being finalised (Motshekga, 2010). The curriculum C2005 selected in 1998 is presented next, as it was in operation during the duration of this study.

C2005.
The Education Department decided that from 1998, following the adoption of OBE, the old curriculum in which black, Indian, coloured and white learners studied different curricula, would be phased out and replaced gradually by C2005 (DoE, 1997). The Revised National Curriculum Statement (RNCS) was also formulated in 2000 to streamline and strengthen C2005, and was committed to OBE. The goals and values promoted by the curriculum were to develop not just the individual, but to develop a South African identity different to that of the apartheid era (DoE: RNCS, 2002). The changes clarify the terminology and the concepts underlying C2005, as well as define learning areas, learning outcomes and assessment standards (DoE: RNCS, 2000). Critical outcomes have thus become part of the curriculum in South African education.

According to Taylor and Vinjevold (2000), the new curriculum aimed at being “radically constructivist in its epistemology and radically democratic in its management of knowledge”
(p.175). The theory underpinning C2005 reflects the premise of a constructivist theory, where learning is viewed as a process of constructing meaning, reflecting particularly Piaget’s and Vygotsky’s perspectives (DoE, 2002). While Piaget proposed learning and development occurring as the individual interacts with the environment, Vygotsky said that it was necessary for a human mediator to intervene between the environment and the child (Smith, Dockrell & Tomlinson, 2000). These concepts will be further discussed in chapter three on cognition and cognitive theories. Constructivist theory acknowledges the teacher as a facilitator, who should provide the experience whereby learners learn. In addition, learners need to be active, constructing their own meaning based on prior knowledge within a social context. The DoE (2002) endorsed C2005 as it advocates the use of constructivist teaching methods to ensure a learner-centred classroom. As mentioned above, C2005 is based on the ideals of promoting the potential of all learners and it is based on life-long learning for all South Africans, regardless of colour, race or gender. C2005 focused on “fostering learning that encompasses a culture of human rights, multilingualism, multiculturalism and sensitivity to the value of reconciliation and nation building” (Aldridge et al., 2004, p.245).

Even though C2005 was presented as the proposed curriculum, difficulties inherent in the existing system were still present, including limited resources and low levels of adequate training among teachers (Brodie, 2000). These issues are important as the teacher plays a key role in interpreting and applying the curriculum. A case study presented by Brodie (2000) showed that despite the benefits of C2005, which requires a paradigm shift for teachers, the classroom resources also needed to be considered, including the teacher-learner ratio. Brodie reiterates that even though teachers are willing and may apply the theoretical constructs of Vygotsky’s framework of mediating in the zone of proximal development (ZPD), more improvements may be possible if practical factors such as overcrowded and under-resourced classes are addressed. It was also noted that the schools in poorer communities had limited choices in the curriculum due to limited resources (Madisha, 2001). These are fundamental factors which need to be considered in order to ensure that the classroom context can provide a favourable environment for effective learning. A review committee was set up to evaluate the curriculum as it was seen as the key to transformation in education (DoE, 1997).

RNCS was presented and ratified in 2002. The learning areas, critical outcomes and developmental outcomes are included next, as the assessment and intervention in the present study are related to principles in the curriculum (C2005). The RNCS (2002) stated that eight
learning areas would be focussed on. A learning area is defined as *a field of knowledge, skills and values which have unique features, as well as links with other fields of knowledge and learning areas*. The *seven critical outcomes* refer to the fact that learners should be able to: (a) identify and solve problems and make decisions, using critical and creative thinking; (b) work effectively with others as members of a team, group, organisation and community; (c) organise and manage themselves and their activities responsibly and effectively; (d) collect, analyse, organise and critically evaluate information; (e) communicate effectively using visual, symbolic and or language skills in various modes; (f) use science and technology effectively and critically showing responsibility towards the environment and the health of others; and (g) demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation. The *five developmental outcomes* envisaged learners who are able to: (a) reflect on and explore a variety of strategies to learn more effectively; (b) participate as responsible citizens in the life of local, national and global communities; (c) be culturally and aesthetically sensitive across a range of contexts; (d) explore education and career opportunities and (e) develop entrepreneurial opportunities.

From these critical and developmental outcomes, it can be seen that the DoE was aspiring to achieve through the curriculum a balanced learner who would function independently and be a life-long learner. Additionally, an integration of the learning areas was promoted so that learning was not seen as isolated and fragmented. These principles are also emphasised in the metacognitive intervention applied in this study. Furthermore, included in the revised curriculum is the importance of evaluation and assessments (RNCS, 2002). Teaching, learning and assessment are intricately linked, and the difficulties that teachers experience in this knowledge framework will influence teaching and assessment results, which have serious implications for learner outcomes and educational success. Issues of assessment, language policies and classroom context are examined below.

*Assessment Procedures and Practices.*

Assessment according to the RNCS (2000, 2002) refers to a “continuous planned process of gathering information on a learner, reflecting achievement of specific outcomes” (p.8). The outcomes are divided into critical and specific outcomes. Critical outcomes refer to the overall broad and long-term values and specific outcomes focus on what learners are able to do at specific levels (DoE, 1997; Kotzé, 2002). The learning outcomes (LO) refer to what the
learners should know and be able to do. The assessment standards (AS) describe the minimum level, depth and breadth of what is to be learnt. These are stipulated at every grade and describe the level at which the learner has to be assessed in terms of knowledge, skills and content. Therefore the LO would remain the same from grade to grade but the AS would change accordingly (RNCS, 2002). An integrated approach is thus reflected in this assessment model. Two types of assessment processes exist, namely formative and summative. Formative assessments are more reflective of the shift to OBE (Kotzé, 2002; Nakabugo & Siebörger, 1999). Formative assessments and continuous assessment which are applied at the schools involve a process of integrating assessment into teaching and the development of learners through on-going feedback (RNCS, 2002). The continuous assessment measures are regular, and records of the learners are updated throughout the year. While the learners are encouraged to be active participants in the learning process, the teacher needs to provide specific feedback to the learners to assist them in their learning. The assessment process must integrate several learning outcomes in a single activity or provide a variety of methods through which learners can display their skills (RNCS, 2000; 2002). From the assessment process, it is evident that teachers need to be well organised and systematic as continuous assessments are frequent, demanding meticulous management, record-keeping and summation reports. Teachers also need to act as agents of change in the curriculum, as their feedback should influence their interaction and instruction with the learners. Moreover, the quality of assessment should reflect the learning programmes taught (DoE, 1998).

The DoE (1998) also envisaged an evaluation of literacy and numeracy skills at crucial points in the learner’s educational development in order to address the urgent issue of quality assessment. This occurs at grade 3, grade 6 and grade 9, as these are exit levels of the various phases. The current study made use of the reading measure designed and piloted by the Joint Education Trust (JET) education services for DoE, at the pre-, mid- and post-intervention phases. The details of this assessment measure are described in the method chapter. The concept of assessment measures may not be fully incorporated into the school system, as teachers seem to refer more frequently to the continuous assessment measures and the portfolios that are utilised. Summative assessments are also included at the beginning of each year, giving an overview of the learner’s progress. In addition, the DoE organises assessments in literacy and numeracy, which are conducted by their collaborative NGOs and these are reported to the schools. The value of any assessment can only be achieved if the feedback provided by the teachers assists the learners in developing their skills. Suitable
assessment practices are thus necessary for development, specifically learner understanding and higher-order cognitive processing, as well as for realising the vision set in the new curriculum (Kotzé, 2002; Nakabugo & Siebörger, 1999).

**Language Policy and Practice.**

A second issue that arises in with regard to C2005 is the policy of language. Language has been and continues to be an area of contention as South Africa is a diverse, multilingual and multicultural society. Language policy and practice is also an issue in other African countries as indicated earlier in this chapter. Two Acts were passed by the South African government, that is, the South African School’s Act (Act 84, 1996) and the National Education Policy Act (Act 27, 1996) to consider the language policy. These two policies complement each other even though each has its own objectives. Both, however, promote the recognition of the diverse cultures; promote multilingualism and the development of national languages. The policies also indicate that the home language should be maintained while at the same time additional languages should be developed, so that languages that were historically disadvantaged would now be valued. It is important that the rights of individuals be protected and that the school’s governing body (SGB) are responsible with regard to how a school promotes multilingualism (National Education Policy, Act 27, 1996).

The DoE introduced the policy of additive bilingualism, where learners could learn in their mother tongue, as well as learn one or more of the other official languages as a school subject (DoE, 1997). This policy, however, was difficult to implement as indicated by De Klerk (2002), and Dixon and Peake (2008), and may be related to the difficulties the education system experienced since 1994. The UNESCO Institute for Education looked at the language issue in 13 African countries. They stated that African students who did not learn in their mother tongue were seriously disadvantaged academically (Sukhraj, 2005). In South Africa, following democracy, the mother tongue was only used in the foundation phase of some schools and the learners were then introduced to English as the LoLT in the intermediate phase. Several learners initially experienced difficulties in the changeover as the demand and complexity of the content in these grades had also increased simultaneously. Sukhraj (2005) states that academics, who acknowledge the benefit of the mother tongue as a LoLT, maintain that learners need to learn in languages that are developed to meet the needs of the curriculum. Despite this view, LoLT should not take place at the expense of the mother tongue and should be included as added languages in the curriculum. Parents often select
international languages as LoLT so that their children will have more opportunities in the
global market (Dixon & Peake, 2008; Taylor & Vinjevold, 2000). Multilingualism therefore
is an opportunity to develop communication and learning in all South African schools.

The South African education curriculum described is founded on the pillars mentioned in
Piaget and Vygotsky's theories. The philosophy of education proposed is to develop thinking
learners who actively participate with their teacher in constructing knowledge. The aims and
outcomes for the learners with regard to this philosophy underpin the present study which
looked at metacognitive instruction within the classroom. C2005 was examined by special
committees which included educators, experienced teachers, curriculum experts and
academics. Its implications for education were questioned not in terms of its integration but
rather in terms of its conceptual coherence and progression (Cross et al., 2002). Furthermore,
challenges at the process level were also indicated. The process proved to be lacking in
alignment between the development in curriculum, teacher training and the development,
selection and supply of learning materials. This was crucial as the success of the
implementation of C2005 lay in the alignment of these three pillars (Potenza & Monyokolo,
1999). As teachers are key mediators in education, omission of effective training and
continued education in instruction are major deficits in the system and this would hinder
progression from the proposed progressive model of education (Muller, undated). Instruction
and its impact on learning are thus further examined in chapter four, as this forms the core of
education in the classroom.

The curriculum developed for schools and described in the RNCS (2000) include the learning
areas of literacy, numeracy, natural sciences, economics and management sciences, social
sciences, arts and culture, technology and life skills. The development of literacy and its link
to the curriculum are discussed next as it forms the context in which the metacognitive
strategies in this study are applied. These strategies are specifically applied to literacy and
then generalised to other contexts.

2.6 Literacy Development within the South African Context

An understanding of the development of literacy in South African schools is important as it
provides insight into the content used in the intervention, as well as adding to the main
rationale for this study. Literacy in the following sections is discussed in terms of its level in South African research, its link to language and cognition which are essential to its development, and its contribution to the curriculum, as well as the current methods used to promote the skill.

Statistics on literacy levels in South Africa from the mid- to late-90s indicate that between three to four million South African citizens aged 15 years and over have had little or no schooling and may be presumed to be illiterate (Aitchison & Harley, 2004). Although this figure is alarming, it is even more distressing to learn that South African learners were reported to perform more poorly than those in neighbouring countries like Mozambique, Swaziland and Botswana (Barry, 2006). Literacy levels in schools are thus a major cause of concern, and have been described by the former Minister of Education, Naledi Pandor, as “a crisis in our system” which needs to be addressed immediately (Barry, 2006). The concerns regarding the levels of literacy locally and internationally are reflected in the literature (Barry, 2006). Explicit instruction on reading is therefore necessary for reading success (Eilers & Pinkley, 2006; Pandor, 2006). Even though this seems self-evident in understanding the development of reading, it is worrisome that according to the findings of the PEI (1998) research, many teachers, as a result of the introduction of the new curriculum on literacy, were unsure whether reading was specified as an outcome of C2005 or that reading should be taught as an explicit activity (Taylor & Vinjevold, 2000). This lack of fundamental knowledge may explain some of the limitations of literacy development in South African schools.

The statistics on illiteracy levels include both young and older adults, and the presumed effects on the individual’s self-concept, society’s development and the country’s economy. Given this overview of the country’s literacy status, one needs to then examine more closely what is understood by literacy performance within the South African school structure. The South African schooling system must be considered as a bimodal structure, which means that two systems are operating concurrently. According to Fleisch (2008), a bimodal distribution of achievement occurs where 70-80% of primary school children (first cluster) are from disadvantaged schools where the majority are unable to read fluently in the school’s instructional language. The second cluster refers to children from predominantly middle-class families attending better resourced schools in mainly urban areas and whose levels of reading can be equated to that of some schools in Germany and the United States. Fleisch (2008)
presents several reasons why the children from the first cluster are lagging far behind the children from the second cluster. Despite the change in government in 1994, huge discrepancies in resources inherited from the apartheid era were evident between urban, peri-urban and rural areas. “Children from the poor or disadvantaged schools acquire a more restricted set of knowledge and skills than children attending the more privileged schools” (Fleisch, 2008, p.2). The schools in rural areas are also less resourced, with limited facilities. Many parents in these areas are unemployed, and home and social circumstances seem to impact greatly on school achievement. With limited transport systems, many children travel long distances to attend the nearest school. Many of the issues relating to gender and poverty as discussed in the UNESCO report (2005) are relevant in this context. The statistics therefore need to be considered in light of this obvious disparity which exists in South Africa.

Pandor (2007) in her speech reiterated that even though the literature indicates that social deprivation is correlated with poor academic performance, it was their fundamental task as the South African Education Department to provide a better system to overcome this or to reduce the lag. The South African government, as mentioned above, has put systems in place with the hope of reducing disparities between rural and urban areas. It also wants to promote literacy in line with the UNESCO EFA goals, the Millennium Goals and its own Education Department’s literacy goals in line with the constitution of the country. The DoE’s systematic evaluations were applied to schools in 2003, and the results indicated that Grade threes achieved 39% in reading and writing, which was of extreme concern to the former minister of education (Fleisch, 2008). These DoE systematic evaluations were formulated for Grade three (foundation), Grade six (intermediate), and Grade nine (senior), which form the exit levels of the different phases.

As Grade six is the focus in this study, statistics reflecting this level of skill are explored. In 2003 Grade six learners (34 015 learners) from 1000 schools were evaluated in the areas of maths, language and natural sciences. Mean scores of 35% for language, 27% for maths and 41% for natural sciences were obtained (Fleisch, 2008). The results indicated that, within the language domain, two-thirds of Grade six were underperforming for their grade level. A further study was conducted by the Western Cape Education Department on Grade six learners. They found that out of 34 596 learners only 35 % were performing at the expected level for the curriculum. These results were analysed within the framework of the two clusters and huge discrepancies were evident in performance levels. On average, four out of
five children from more privileged schools compared to four out of 100 children from disadvantaged schools were coping with the literacy curriculum. The Western Cape’s report confirmed that the majority of Grade six learners had not mastered the basics of reading and maths (Fleisch, 2008).

A further study by Moloi and Strauss (2005), as part of the Southern and East African Consortium for Monitoring Educational Quality (SACMEQ II), was conducted among Grade six learners in its 15 membership countries which included Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Mainland Tanzania, Tanzania (Zanzibar), Uganda, Zambia and Zimbabwe. Of the 3163 randomly selected Grade six learners in South African schools, approximately 50% of them were unable to read for meaning. On further examination of these results, it was indicated that the urban schools performed better than the rural schools within the provinces. This confirms that a difference exists between the clusters within provinces (Fleisch, 2008). Studies on literacy, when analysed further, indicated that reading for meaning, which is the fundamental aim of reading, was correlated with socio-economic levels, and children from higher socio-economic levels were better at reading for meaning than children from lower socio-economic groups (Moloi & Strauss, 2005).

A study by Schollar (2004-2007) indicated interesting facts about learner performance in mathematics. This study required the learners to hand in their rough work on which they made their calculations. A definite pattern of thinking emerged in Schollar’s study, where intermediate-phase learners were observed to be concrete-bound, calculating in units. The learners were also observed to have used repeated addition instead of multiplication. He indicated that 60.3% of the Grade seven learners rely on unit counting, with 11.5% using this method exclusively (Schollar, 2004-2007, p. 6). Even though these outcomes are reflective of the learners’ thinking and skills in mathematics, it may also be related to the type of instruction given in class. These observations are vital as the type of instruction, the quality of teaching and the training of teachers emerged as important themes. This study therefore examined instruction in the classroom, with emphasis on learners’ reflective thinking, monitoring and evaluating their skills when approaching a task. Reading instruction as presented within the classroom is further explored below with reference to South African schools.
Reading Instruction

A brief explanation of the reading instruction process is presented so that the sequence and the strategies utilised are understood. The specific skills required for reading are expanded on in the next chapter, which looks at the integration of cognition and language, and the link to literacy. The overall reading instruction process is defined by the curriculum but individual schools may apply the process differently reflecting the school’s ethos on education. Reading instruction is introduced in pre-primary grades, focusing on auditory and visual-perceptual skills required for reading. Language skills are essential for literacy development (Bashir, Conte & Heerde, 1998). On entering Grade one, learners are assumed to have the prerequisites for reading in place as grapheme-phoneme correspondence is introduced. Pandor (2007), former minister of education in her speech stated: “South Africa must redouble the effort to expand reading opportunities and to create a reading nation in the country, as reading is a fundamental skill for academic and cognitive development”.

By 1996, the South African government had put into place several relevant policy documents to promote literacy and reading in the country. According to the RNCS’ Policy (2002), each outcome for literacy and languages in the intermediate phase has a different skill as its focus (listening, speaking, reading and viewing, writing, thinking and reasoning, language structure and use). These focus areas should be contextualised into integrated learning activities. Additionally, the content should be linked to learner needs and social issues. These six learning outcomes are described in the RNCS (2002, p.56-57) as follows:

(a) “Learning Outcomes 1 (LO1) - Listening: The learner will be able to listen for information and enjoyment, and respond appropriately to a wide range of situations;
(b) LO2 - Speaking: The learner will be able to communicate confidently and effectively in spoken language in a wide range of situations;
(c) LO3 - Reading and Viewing: The learner will be able to read and view information for enjoyment, and respond critically to the aesthetic, cultural and emotional values in the text;
(d) LO4 - Writing: The learner will be able to write different kinds of factual and imaginative texts for a wide range of purposes;
(e) LO5 - Thinking and Reasoning: The learner will be able to use language to think and reason, as well as to access, process and use information for learning;
(f) LO6 - Language structure and use: The learner will know and be able to use sounds, words and grammar of the language to create and interpret text.”
The assessment standards are also provided but Baatjies (2003) states that even though policy development is evident, explicit instruction on reading is not indicated. Furthermore, C2005 is not only vague on the reading instruction but it also does not indicate how reading will be monitored. Therefore outcome statements cannot guarantee that the required skills for reading will be achieved. Promoting literacy is insufficient in itself, as support structures need to be put into place to ensure some measure of success. According to Baatjies (2003, p.4), “The policies are in place but the political will which is associated with the mobilisation of resources is lacking”. Schools which have the resources can maintain the good practice of encouraging learners to read and monitoring their progress, but as mentioned earlier the majority of schools in South Africa do not have the facilities and the resources. Continued reading instruction is also not maintained in grades higher than the foundation phase, as it is assumed that those skills required for reading are in place, yet numerous learners in the intermediate phase may be unable to read fluently (Fleisch, 2008). Baatjies (2003) believes that a reading policy should be formulated, which would include the development of tools to measure and monitor reading, implementation of educator training programmes, as well as provision of reading materials and evaluation systems.

Continuous assessment is the process applied at schools for all learning areas including the language areas in the curriculum. All language areas are considered part of literacy rather than just reading, as language areas are not fragmented units but are an integral part of reading as a whole. Baran (2007) states that learners’ metalinguistic skills are dependent on the inter-relatedness of their language components (in other words syntax, semantics and pragmatics) and their cognitive skills, in relation to reading. For metalinguistic skills to develop and be effectively applied in learning, thinking and reflecting on language, as well as analysing the language structure and synthesising the information to provide coherence, all need to be taken into consideration, and is something that does not emerge in isolation. The link between the different areas is indicated in the school curriculum and is essential for continuity in the learners’ development. The curriculum for literacy is graded, and the learning outcomes at the different levels include the reader reading for information at Level 1. Level 2 includes explanation of what is being read to indicate the learner’s understandings of the text. Level 3 requires more abstract reasoning than the previous two levels (DoE, 2002). The teacher in the current study explained that all tests and exams in the experimental school had to include questions of Level 3 whereby 10-15% of an exam had to be at Level 3.
where abstract reasoning is included (R. Soodyall, personal communication, December 8, 2008).

Although making meaning of a text is the key in reading, there is a dearth in the literature with regard to the instruction to enhance the ability of the reader to comprehend text. Massey (2003) indicates that there are strategies to assist readers with decoding but strategies to enhance comprehension are more difficult to find, and that teachers spend little time actively teaching comprehension strategies. Although comprehension is a central component in the language arts curriculum in the United States, with four-five hours of a school day spent on literacy-related activities, there is still considerable room for improvement (Barton & Sawyer, 2003). It is difficult to apportion a particular ratio of time specifically for reading comprehension in the South African intermediate phase curriculum, as the focus is inclusively on the language components of speaking, reading, writing and language. Active comprehension during reading is of utmost importance and implies that learners have to engage their cognitive abilities and develop strategies that they can generalise to other texts. The current study therefore aimed to promote metacognitive instruction relating to reading comprehension so that learners could reflect on their thinking when understanding text.

2.7 Summary of the South African Educational Context

From the above discussion it is evident that education is a fundamental human right and, based on this premise, the United Nations has declared the years 2003-2012 as the Literacy Decade. As reading forms the foundation for cognitive and academic development, effective literacy systems have to be put into place. South Africa is experiencing many of the human rights issues that countries post-democracy face as a result of previous deprivation. The constitution in this country, however, provides hope for a better education for all. Together with international donors, the United Nations and the World Bank, South Africa is committed to ensuring a literate nation.

The education system adopted in South Africa promotes life-long education and training access for all, which aims not only to improve the quality of life, build a peaceful, prosperous and democratic society, but also endorses a constructivist approach to learning and teaching within a social paradigm. Despite these principles expressed by the OBE framework, there
are several issues of concern not in terms of its constitution but rather in its design for South African education and its implementation in schools. The lack of alignment between the curriculum, teacher development and learning materials is a major limitation in its successful implementation (Potenza & Monyokolo, 1999). Nevertheless, the South African school context is relevant, as the ideals set by the education department relates to the premise of the intervention method utilised in this study.

The cognitive education approach that is promoted in the present study has its roots in a constructivist model and is aimed at developing the potential of all learners. Such metacognitive instruction has application not only for reading (even though this is the focus in the study), but for reflection on thinking in all areas of development, ensuring active engagement in the learning process. It is also aimed at promoting life-long learners who are independent and interdependent, creating a culture of curiosity in South African communities. Furthermore, the importance of instruction is highlighted. The cognitive theory that motivates this intervention study is discussed in chapter 3. Teaching and learning theory, practice and research, which form essential components in education, are then discussed in chapter 4 and the intervention process is examined in chapter 5. Literature reviews examining cognitive and metacognitive studies locally and internationally are also included in these chapters.
Chapter 3: Theoretical and Conceptual Framework for Literacy Development
3.1 Introduction

The former president of South Africa, Nelson Mandela, recognised the crucial role that education plays, as can be seen in the above quote and he believed that education is the key to changing the world. Literacy, which is fundamental in education, provides the context of the present study and its importance cannot be underestimated. Literacy, which lies at the core of acquiring education and life skills, has been shown in the UNESCO’s report on Education for All (EFA: UNESCO, 2005) to be one of the most neglected of the six goals adopted in the World Education forum in Dakar, Senegal, in 2000. Understanding literacy is crucial in the intervention process applied in this study. This chapter therefore explores the underlying components of cognition and language, as well as the reading process, which are essential for effective literacy development. In addition, this chapter is linked to the instruction discourse in chapter four, which influences teacher and learner engagement as it reflects the process of knowledge construction in the classroom. This chapter also has relevance for chapter five which introduces the metacognitive intervention, as well as a review of the studies in cognitive education. As reading involves complex cognitive processing and language skills, these theoretical components are presented separately to provide a better understanding. They are, however, all linked and affect the reading process simultaneously.

3.2 Cognition and Theories of Cognitive Processing

The conceptualisation of cognition, its development and the related theories are explored in this section. As cognition and language form part of the essential pillars for learning, an understanding of these concepts is fundamental to this study. Additionally, cognitive processing and its relationship specifically with regard to academic learning are examined. Human cognitive theories have gained increasing recognition in the fields of psychology and education as they have created a shift in the paradigm of human development as a result of
changes in the understanding of learning and its influence on the development of individuals (Kozulin & Presseisen, 1995).

A number of different cognitive theories are presented in the literature, each with different perspectives on cognitive development, thereby adding to the ongoing debates on cognition and intelligence. Several accounts of traditional, as well as more contemporary theorists describing and explaining cognitive development in children will be examined. These include Bruner, Piaget, Vygotsky, Feuerstein, Sternberg, Gardner, Das and Naglieri. Specific theories that aided in the formulation of the conceptual framework for this research were selected, including those of Piaget, Vygotsky, Feuerstein, as well as Das and colleagues’ planning, attention, simultaneous and successive (PASS) theory (Das, Naglieri & Kirby, 1994). These theorists’ contributions with regard to human and cognitive development, learning in a social context, and the human factor in the mediation process form the theoretical foundation of the intervention introduced in the current study. Their theories will facilitate an understanding of the outcomes of the study and help to understand the learner’s cognitive performance.

Each theory has a distinct but complementary theoretical base. The mental processes discussed by the different theorists provide an understanding of what is involved in cognitive development and its influence on learning. Nicolosi, Harryman and Kresheck (1989) define cognition as a general concept, embracing all forms of knowing, perceiving, remembering, imagining, conceiving, judging and reasoning. For this study, cognition, which is a broader term than intelligence, is the main focus as it is more relevant to the cognitive functions and development examined in the processing of information. The literature, however, often uses the terms of cognition and intelligence interchangeably as intelligence encompasses cognitive abilities and executive functions. The theorists are presented sequentially in a historical continuum but are mentioned and discussed when and where required in order to substantiate any assumptions made.

Bruner (1997) and Garton (2004) believe that Piaget and Vygotsky play a major role in their contribution towards understanding cognitive development and cognitive changes in individuals, and have significantly influenced educational programmes locally and internationally. This chapter thus begins with Piaget and Vygotsky’s work on cognitive development, and proceeds to include Feuerstein’s socio-cultural notion of mediation. These concepts on cognition are also considered in terms of the processing of information which
influences how individuals learn. Information is processed efficiently when these cognitive functions are intact. However, when a breakdown in processing occurs, appropriate interventions can be applied if the breakdown is identified and analysed. Cognitive processing can be understood in line with the PASS model of Das et al. (1994) and the cognitive processing model of Feuerstein et al. (1980), which includes the input, elaboration and output phases. These are discussed in more detail when the work of each theorist is examined below. Furthermore, the cognitive theories are looked at in terms of their relationship to language development and competence as both language and cognition are considered higher-order functions of the human mind (Witt, 1998). Specific aspects from the works of the selected theorists are highlighted and discussed in relation to the present study and, in view of the overwhelming contribution each theorist has made to cognitive development, should not to be assumed as being reductionist.

3.3 Cognitive Theorists

Jean Piaget:
Piaget, a Swiss psychologist, presented an influential theory of cognitive development described as constructivist, since he believed that individuals construct their own cognitive abilities through self-motivated action in the world (Wood, 1995). Piaget’s work is examined in terms of the development of the theory of intellectual processing; stage theory and language acquisition, and the relevance of these views will be linked to this study. Piaget began as an epistemologist, studying the concept of “knowing” (Bruner, 1966). His work revolved around the nature of the growth of all knowledge in all disciplines whereby he investigated the origins of human knowledge including logic, language, play, time and space, as well as psychological processes of reasoning, imagery, perception, memory, imitation and action. He also looked at genetic epistemology, philosophy and biology (Gruber & Vonèche, 1977). Piaget’s contributions evolved within and across disciplines, adding substantially to the fields of psychology and education (Bruner, 1966, 1997).

Piaget believed that children were born with a set of human systems, referred to as sensorimotor structures, which allowed them to engage actively with the world, constructing and reconstructing their representations of the world via their experiences (Witt, 1998). Furthermore, Piaget stated that “the mind builds its knowledge structures by taking external
data, interpreting, transforming and reorganising them", hence the term "constructivist" (Flavell, Miller & Miller, 1993, p.4). He believed that the innate structures and the experiences of a child lead to the construction of knowledge. According to Piaget, cognitive changes occur in interaction with the environment as a result of disequilibrium or cognitive conflict. Piaget depicted children in his theory as biologically driven, adapting to their environment through mental processes of assimilation (process where new experiences are incorporated into existing schemas or applying what you already know) and accommodation (process where new representations are modified based on the experiences or adjusting your schema to take in the new knowledge), which result in increasingly complex cognitive organisation (Garton, 2004). Thus, in any cognitive experience, both assimilation and accommodation occur in a mutually dependent way. This model provides an understanding of how an individual’s cognitive system interacts with the external environment.

Piaget also believed that these mental structures or schemas change as the child matures, allowing for greater cognitive flexibility. These mental structures, according to Piaget, are essential in constructing knowledge about any experience as perception of any observation is insufficient (Gruber & Vonèche, 1977). Furthermore, the child needs to be active in engaging with these representations to create a shift in understanding, and thus the use of thinking is fundamental to learning. Children progress from being unaware to being increasingly aware and conscious that they need to reflect on their intellectual processes for intellectual growth to occur. Terms including structuralism, interactionism, constructivism and logical determinism are used in the literature to explain Piaget’s theory of cognitive development but they do not sufficiently encapsulate his work. Gruber and Vonèche (1977) suggested therefore that the term of genetic epistemology be used as it would reflect the interactive nature of these theories. Regardless of the inclusiveness of this term or other terminology used, Piaget’s work provides a fundamental framework for understanding how the child learns. For intellectual growth to happen, the individual needs to take responsibility and engage with the environment, which will provide powerful logical structures, allowing the individual more cognitive flexibility. This principle is important to the current study, where learners are made aware of their thinking, are taught reflective skills, and then encouraged to apply their skills when engaging in the task, ultimately making the learner accountable in the learning process.
A second aspect of Piaget’s work is the concept of stages, which is central to his theory. The four stages of cognitive development, i.e. sensorimotor (birth to two years), preoperational (two to seven years), concrete operational (seven to 11 years) and formal operational (11 – 15 years and beyond), provided some scholars with a window into the cognitive development of children, while others believed that these stages were too inclusive and restrictive (Witt, 1998). Several questions regarding these stages have arisen, one being whether development stops when the child has reached the formal operational stage. From Gruber and Vonèche’s (1977) anthology, it can be surmised that even though Piaget did not elaborate extensively on the stage theory, he did provide a description of these stages, adding to the understanding of cognitive development of the child. Piaget’s theory of learning highlighted the importance of the hierarchical sequence that children follow when learning and developing knowledge. Piaget’s theory of knowledge construction rests on these operational stages of development and unlike his critics, he focused on sequence rather than age norms for development. In addition, Piaget saw development not as present or absent at any stage but rather as progressive transformation, differentiation and integration (Smith, 1993 cited by Lourenco & Machado, 1996). Critics of Piaget’s stages who saw the formal operations as the final stage of development did not realise that Piaget’s formal operation stage provided a good model for the post-formal stage which they themselves were involved in. Piaget’s major works include “interactionism, assimilation, accommodation, the equilibrium model, progress decentration and intellectual operations”, which do not depend on the stage theory (Gruber & Vonèche, 1977, p.xxvi). However, in order to appreciate logical thought processes and the hierarchical growth of cognitive structures in later adolescent stages, an understanding of the relationship to stage theory was required. The criticism of Piaget’s theory being linked with inappropriate logic was countered by Piaget’s belief that knowledge from the beginning was always involved with organisation, inference and meaning. For Gruber and Vonèche (1977, p.xxvii), Piaget’s work is a “brilliant reflection of the changing intellect of the human mind”, contributing greatly to an awareness of how children think.

Witt (1998) discusses Piaget’s cognitive stages in relationship to language acquisition. Piaget followed the school of cognitive determinism which believed that cognition influenced language acquisition and development. Piaget argued that a child’s development of language and thought occurred as the child transitioned from one operational stage to the next. These changes in the operational stages are accounted for by the concept of disequilibrium. For Piaget, language served multiple functions that developed with age. At the end of the
sensorimotor stage, Piaget felt that language was one of the mental activities that were made possible by the development of representational thought. As a result of his observations, he believed that egocentricism was evident in the preoperational stage, where children were focused within themselves, unable to see the point of view of another individual. Piaget saw language as a growing representation of the changing cognitive functions or mental activity in the child (Witt, 1998). In the final stage of formal operations the child is able to deduce, reason, infer and hypothesise. It is at this stage of socialised language that the child moves to abstract thought and concept formation. It should be remembered that when Piaget used the term *genetically prior* with reference to thinking and language, he did not indicate that language had no role in the development of cognition but rather that cognition was a necessary step to language acquisition (Witt, 1998). The cognitive hypothesis thus viewed cognition as preceding language, and obligatory for its progress across all stages of development. It can also be argued and is supported by the language hypothesis that language influences cognition, and this will be referred to later in the language section of this chapter.

Piaget looked at the organisation of thinking, moving from a fragmented to a more cohesive and holistic view. He maintained that cognitive functioning and development were reliant on the environment as well as on the individual. Although Piaget did not expand his discussion to the environment and the extent to which it influenced but not necessarily specified changes on cognitive development, he did not deny the environmental impact on the individual (Garton, 2004; Gruber & Vonèche, 1977; Smith et al., 2000). Bruner (1997) confirms that Piaget included the social variability of intellectual development, but that he did not expand on the social and the cultural concepts of learning. Piaget’s focus on the individual rather than the social context in which the individual functions was the point of departure for other theorists. Kozulin and Pressseisen (1995) point out that Piaget is criticised for neglecting the socio-cultural aspect of learning and the absence of “others” in the child’s learning environment. However, social neglect was continually discussed regarding Piaget’s work, even though Piaget at no point denied the need for social factors in cognitive development. In fact Piaget indicated that the individual organises his operations by engaging and exchanging his thoughts with others as well as cooperating with others, which are all social operations. The latter concepts, which are basic to learning theory, are explored further in the works of Vygotsky and Feuerstein.
Piaget’s work was appraised on several levels by researchers in the literature and some aspects relevant to the current research are explored. The competencies of children were said to yield a conservative assessment of the child but this was underestimated in replication studies of Piaget’s tasks. However, from Lourenco and Machado’s (1996) review of the criticisms, it is evident that several of the studies were methodologically different from Piaget’s original work and that there was a conceptual misunderstanding of Piaget’s goals. Furthermore, Lourenco and Machado (1996) point out that critics of Piaget’s work do not see the contribution he made to our understanding of the cognitive potential in children, and those who say that Piaget described rather than explained his findings are oversimplifying the issues, as Piaget felt that description was necessary before explanation. In addition to the fact that many critics may not have understood Piaget’s style of writing, there might have also been the issue of conceptual misunderstanding. Lourenco and Machado (1996) maintain that to understand Piaget’s work, it needs to be considered from within the theory.

Piaget’s theory forms one of the foundations on which the understanding of cognitive development for the current research rests. It is said that the importance of active problem-solving and reasoning abilities is fundamental to Piaget’s theory (Bruner, 1997). This theory of active construction of knowledge is essential in the process of interaction, which forms an integral part of the metacognitive intervention in the present study. There were other theorists that also saw knowledge construction as an active process and these are discussed below.

_Cev Vygotsky:_

Vygotsky is discussed in terms of his socio-cultural perspective and instruction to learning approach, as well as in terms of his contribution to language and cognition. According to Garton (2004), Vygotsky’s approach presents a more holistic view of cognitive development as in this approach each aspect of learning is seen to influence the other and takes place within a socio-cultural context. Vygotsky, a Soviet psychologist in the 1900s, had a significant influence on social theory, and how humans shape and are shaped by their social, cultural and historical conditions (Daniels, Cole & Wertsch, 2007). According to Vygotsky, children learn through interaction with others and their environment. His focus on the socio-cultural emphasis on learning as well as on the symbolic tools of language greatly contributed to psycho-educational theories, and increasingly more attention is being paid to his theory as the importance of social and cultural factors on learning is becoming evident. Gindis (1999)
indicates that Vygotsky’s works are being reintroduced as a promising alternative to that of Piaget, especially in the United States. This section examines Vygotsky’s work in terms of learning and development, the zone of proximal development (ZPD), socio-cultural and historical context, as well as language and inner speech.

Learning and development:
Vygotsky described human development as a sociogenetic process occurring in social activities (Gindis, 1999). The child learns and develops through internalising social and cultural relationships. Vygotsky believed that the process of human development could not be seen as fragmented and had to be understood within the social and cultural order in which it operates, and it is thus important to recognise the interdependence between these complex factors. Gindis (1999) described Vygotsky’s view on development as not being “an accumulation or quantitative gain but rather a series of qualitative, dialectic transformation, a complex process of integration and disintegration” (p.335). This, however, does not happen in isolation but rather in collaboration with adults in instruction. Therefore, formal schooling was important for Vygotsky because it contributed to the development of higher psychological functions. “Schooling” was described as an artificial mastery of the natural process of development (Vygotsky, 1934/1987). Here the child works with a teacher who questions, explains and informs, assisting the child to figure out the learning process. When exploring the zone of proximal development (ZPD), which is discussed later in this section, it can be seen that learning and development influence each other. However, development lags slightly behind learning, as learning when organised, results in mental development that would not have occurred apart from learning. Nevertheless, learning and development are not accomplished in equal measures nor do they emerge in parallel (Vygotsky, 1934/1987).

The mental or psychological processes that a child develops must be considered in conjunction with the notion of mediation and this is reiterated in a later section dealing with socio-cultural and historical context. Vygotsky believed that mental processes are socially formed and culturally transmitted. The psychological functions can be described as two classes, a lower or biological class (perception, memory, attention and characteristics of the nervous system) and a higher class (abstract reasoning, logical memory, language, voluntary attention, planning and decision-making) (Vygotsky, 1934/1987). These psychological processes mediate the human activity and can only develop through use or application, and are not an automatic process. They also influence the child on two levels, “firstly on a social
level, among people, inter-personally and then within the child, intra-personally” (Vygotsky, 1978, p.57).

Even though Vygotsky never explicitly referred to the concept of internalisation, this concept refers to what the individual can do spontaneously and unselfconsciously with the aid of an adult. This then becomes part of the individual’s learning, giving him or her control and creating ownership of this learning, thus developing competency (Van Geert, 1999). Internalisation also implies that cognitive growth in this process of learning has socio-ethical implications, as the child actively understands the context and the individuals within that context when learning (Shotter, 1999). As the child matures, the mental processes evolve representing a “holistic system of inter-functionally related capacities” (Bakhurst, 2007, p.52). Therefore Vygotsky used the term dialectical materialism referring to the concept of “whole”, indicating that the whole child must be the focus rather than seeing the mental processes as unitary functions. Each function, such as attention or memory, is what it is by virtue of how it relates to the other functions (Vygotsky, 1993).

**Zone of Proximal Development.**

When discussing learning and development, three different theoretical viewpoints are examined (Vygotsky, 1978). They are mentioned so that a distinction between these theoretical perspectives and Vygotsky’s view can be understood. The first is similar to Piaget’s view, which sees learning as independent of development, where it uses the achievements of learning but which do not influence the course of development. The second view sees learning as developmental. Both views are inseparable. The third view combines these two viewpoints and sees the two processes as mutually dependent. Vygotsky, however, rejects these views and introduces the zone of proximal development (ZPD) as a new approach (Vygotsky, 1978). His notion of the ZPD explains an individual’s achievement levels. He defined the ZPD as “the distance between the actual developmental levels as determined by independent problem-solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1978, p.86). Development can then be understood on two levels - actual development and potential development.

The ZPD forms and develops within a dynamic field of interaction between the child and the adult or a more knowledgeable other, exploiting more of his or her potential (Jeltova, 2004).
The child will make faster progress depending on the optimum competency of the learner and the optimum assistance by the adult (Van Geert, 1999). The learning awakens the various capacities of internal developmental processes, and through interaction these processes become internalised resulting in independent developmental achievements. According to Vygotsky (1978), the essential feature of learning is that it should be challenging, creating the ZPD and as the learner develops, concept formation is realised. Explicit classroom instruction creates the ZPD for a learner (Greenberg, 2005a). For learning in the ZPD to occur, both internal and external factors have to be considered. These include:

\[ \text{the ethos of the environment in which learning takes place, the level of the task, the attitude, beliefs and expectation of the knowledgeable other, pragmatic skills of the learner, expectations of the learner, the evaluation process of learning, teaching pedagogy and concept formation, linking thought and language, where learners take the abstract and the new ideas, and modify their understanding of the world (Vygotsky, 1978, p.282).} \]

Therefore, the notion of the ZPD has important implications for teachers and the teaching materials selected since not only memory recall but deductive and inductive reasoning, and problem-solving abilities should be the focus of teaching and learning. Karpov (2003) agrees that the ZPD is of utmost importance in education as it indicates the direction in which future learning will proceed. So the process moves from interdependence until internalisation happens to independent application of learning. Bruner (1997) argues that the ZPD recognises that human beings require teaching in a systematic manner. Furthermore, he believes that the ZPD looks at “what it takes to teach and to be taught by another” (Bruner, 1997, p.69). This concept of mediation in the ZPD is central to Vygotsky’s work (Karpov, 2003). When examining “actual development” it reflects retrospective development, while the ZPD indicates “potential and possibilities” and thus reflects development prospectively. The notion of a ZPD has powerful implications for education and instruction, which may de-emphasise defect and cultural differences evident in South African schools, and may encourage developmental models and untapped potential.
Mediation within the socio-cultural and historical context.

Vygotsky differed from Piaget and other theorists on development, as he emphasised the socio-cultural and historical influence on individuals. He stated that the development of the higher mental functions and learning originate as actual relations between the individual and society (Vygotsky, 1978). Contextual influence on cognitive development included not only the socio-cultural context but also the intellectual environment. The interrelations and interdependency influence the individual’s potential. According to Daniels et al. (2007) “the environment can only be commented on in relation to the organism living in it” (p.22). The environment is constituted by the individual and his or her response to it (Daniels et al., 2007). From Vygotsky’s perspective, the environment and the individual cannot be seen as two separate entities as they mutually shape each other.

Vygotsky also highlighted the human element in the social interaction process in addition to language as a tool for mediation. Unlike Piaget, Vygotsky saw instruction as the heart of learning development, and he defined learning as the “capacity to learn through instruction” (Wood, 1995, p.9). The human agent in instruction refers to a more knowledgeable “other”, and may include peers or adults (Carter, 2005). This process of mediation creates a bridge between the mental and socio-cultural processes for cognitive development to take place (Wertsch, 2007). The child works in collaboration with the adult, who engages him or her through questioning, providing information and explaining. The knowledge formulated, however, is the responsibility of the child who uses his or her psychological tools (language, schemas, maps) when constructing meaning (Gredler & Shields, 2004). According to Vygotsky (1934/1987), “the process of learning is figured out by the child in collaboration with the adult in instruction” (pp. 215-216).

The process of learning or developing the psychological tools was further confirmed by Vygotsky’s view on formal schooling. He believed that formal schooling through teacher instruction, contributed significantly to the development of the psychological tools, which is different to Piaget’s view that saw development and learning as spontaneous (Tryphon & Vonèche, 1996). The introduction of the human factor into the equation of learning shifts the focus from direct learning proposed by Piaget to supported or scaffolded learning. The term “scaffolding” may be ambiguous and was debated by Vygotskian scholars. Rogoff (1990) therefore suggested the use of the term “guided participation” instead. Despite the term, Vygotsky noted that children display more competence when they are supported in their
instruction. This assisted influence is best understood in conjunction with the discussion on
the ZPD. Unlike Piaget, who saw universal stages of development, Vygotsky acknowledged
an individual’s potential for change. He stated that the historical context allows for the
experiences individuals have and as a result of different historical conditions, individuals’
experiences will be different resulting in varied development. In addition, the social influence
on learning can best be seen in the development of memory, where a more knowledgeable
adult shares strategies to recall information with children during the course of their
interactions (Vygotsky, 1934/1987).

_Language and speech._

Vygotsky viewed the mind as being associated with the construction of meaning which is
dependent on language and the influence of the cultural context in which that language is
used. Furthermore, he indicated that the higher order mental acts do not occur only through
development but continually evolve through language use and social interaction (Bruner,
1997). The individual then internalises the learning from these social interactions into mental
processes. Even though the literature suggests that Vygotsky did not fully explain this
internalisation, it can be seen as a major portion of his work. Vygotsky referred to language,
marks and symbols as psychological tools, which mediate these higher-order mental
processes. The tools are acquired and internalised through interpersonal communication with
more experienced individuals. These psychological tools also regulate the thoughts and
actions of the individual’s self as well as the self of others. Moreover, when the individual
internalises and transforms learning into thought, the individual does not replace but rather
extrapolates from the existing knowledge base to develop higher-order thinking (Bruner,
1997). Social exchanges, where the culture is verbally expressed, are necessary for this
process of development. Bruner (1997) describes it as “the mind allowing the individual to
transcend the boundaries of the cultural order, expressing freedom of thought” (p.68).
Vygotsky (1978) looked at language as a tool to express or reflect the cultural norms and
social interactions the individual experiences.

Furthermore, he considered these higher-order mental processes as functions of mediated
activity. Semiotic mediation of higher levels of thought and action was a central principle in
Vygotsky’s theory, and he believed that language itself played a major role in formulating
knowledge (Vygotsky, 1934/1987). When speech is unified with action, a new organisation
of behaviour occurs. Children can then use their speech to regulate and monitor their
learning. It begins similarly to Piaget’s egocentric speech but when it transforms into inner speech, it aids in the planning and regulation of cognition. In contrast to Vygotsky’s view on speech and language, Piaget did not afford any importance to speech organising the child’s activities, nor did he emphasise its communicative function but he did admit that language had multiple functions. Vygotsky, on the other hand, saw speech as having an essential role in organising higher-order psychological functions (Vygotsky, 1934/1987). He referred to the internalisation of speech as “qualitative transformation”, as the function of speech assumed a higher level of operation. This involved orientating intellectual functions, developing conscious awareness, problem-solving, stimulating creativity, imagination and thinking (Mahn, 1999). Transformation in these psychological tools is evident when a child enters school.

Vygotsky’s analysis of internalisation of social speech formed the foundation of “concept formation theory” and thinking. He revealed the developmental relationship between thinking and speaking, which are interrelated processes. Even though each may have different roots, they merge when they are communicated to share meaning with others (Bakhurst, 2007). Word meaning, which is concept formation, is used to understand verbal thinking (Vygotsky, 1934/1987). When children engage in social interaction, word meaning links this interaction, and when explicit instruction is included, it results in learning and hence development. For Vygotsky, concept formation played a major role in the development of higher psychological functions. These higher functions can only occur through qualitative transformation, that is, when social speech is internalised to assume a higher function (Vygotsky, 1934/1987). The child uses inner speech to assist in solving challenging tasks, and therefore it is important in education to consider the complexity of tasks in order to activate thinking.

Vygotsky’s theory validates that social learning is essential for cognitive development. The importance of group dynamics and pragmatic skills in learning should therefore not be undervalued and are included in the process of the metacognitive intervention of the current study. Witt (1998) states that Vygotsky’s theory of language and learning has generated interest in metacognition as a psychological tool for improving academic ability and has influenced cognitive instructional input. The study reported in this thesis encouraged learners to use metacognitive strategies when approaching a reading comprehension task, as well as encouraged the teacher and the primary interventionist to engage in instruction that stimulated cognition in the learners.
Although Vygotsky’s theory presents several interesting features which are key to the present study, it does not replace Piaget’s contribution, and a combined approach of these theories is applied to the present study. Both theorists have assisted in the understanding of learning development. Their theories point to interaction, shared thinking and the conduciveness of the environment which all lead to cognitive changes. Although Piaget and Vygotsky have two distinct views, Bruner (1997) praised their diversity stating that, “they have both presented rich theoretical accounts which appear incommensurate but lead to a deeper understanding of the evolution of the human mind” (p.72).

Vygotsky’s ideas have been criticised in that he doesn’t address normative development, and that it is difficult to distinguish between the knowledge of the child and that of the adult. Some misunderstanding of Vygotsky’s writing may be attributed to minimal access to his early writings and that translations were only available later. Mahn (1999) also stated that different interpretations of Vygotsky’s work may be a result of ideological, epistemological and conceptual differences. Vygotsky’s theory on the ZPD, his perspective on language and socio-cultural influence on cognitive development are nevertheless important and serve as a theoretical basis for this intervention study.

Reuven Feuerstein:
Although Vygotsky included the human factor in the learning experience, he did not provide a precise account of how learning actually happened other than that it was a “vehicle of symbolic tools” (Kozulin & Presseisen, 1995). This left a hiatus in the theory of mediation. Feuerstein, an Israeli psychologist, thus expanded on the human aspect, building on the role of the mediator, as alluded to in the ZPD (Haywood, 2008). Feuerstein’s major contribution to education was the process of the mediated learning experience (MLE), which attempts to give clarity to the human influence in the interaction between person and environment (Feuerstein et al., 1980). Kozulin and Presseisen (1995) stated that mediation includes philosophical and sociological approaches, and that this notion was formulated prior to the work of Vygotsky and Feuerstein.

Feuerstein began his work as a result of his experiences with children and adolescents who had difficulty learning to read, as well as those whose outcomes on traditional assessment measures did not match conventional learning styles. He realised that the traditional measures
did not reflect the potential of many of the individuals. This directed his interests which later developed into an alternative philosophy to child development, in contrast to that of behavioural or psychoanalytic approaches (Kozulin & Presseisen, 1995). Feuerstein, working in the field of cognitive instruction, was largely influenced by the work of Piaget (Deutsch, 2003) but he differed from Piaget on two accounts - that of socio-cultural neglect as well as learning occurring only through direct interaction with the environment. Feuerstein, like Vygotsky, believed that children learn through both direct exposure and also through the interaction with a more knowledgeable other (Kozulin & Presseisen, 1995). According to Haywood (2003), even though Piaget did not discuss mediation per se, it was fundamental to his constructivist principles. Feuerstein’s view on cognitive development, theory of structural cognitive modifiability (SCM), the role of the mediator and the mediation process are examined in the following sections.

*Structural cognitive modifiability (SCM).*

Feuerstein’s theory of SCM is based on the premise that an individual’s cognitive system is constantly evolving because it is “open and flexible” (Kaniel & Feuerstein, 1989, p.167). According to Feuerstein each individual develops basic core knowledge, including logical structures and these structures can change. These structures if ineffective in function can adapt with guidance and can be modified to be more effective for learning (Feuerstein, 1979; Feuerstein et al., 1980; Haywood, 2008). Based on his experiences and research, especially with the youth of North Africa emigrating to Israel, Feuerstein concluded that all learners are modifiable if the appropriate mediation is imparted. Mediation refers to a process where a more knowledgeable other (mediator) can frame the learning for the child by intentionally focusing the learning, and taking the child to another level of learning (Kaniel & Feuerstein, 1989). Mediation in this study is understood and used in this sense. Mediation is discussed later in relation to the direct learning process. The modifiability of the cognitive structures is best explained through the MLE process (Feuerstein et al., 1980).

Modifiability is dependent on the individual’s ability to learn and to react to stimuli with strategies, as well as the ability to monitor his or her learning. Feuerstein examined two groups of learners with regard to SCM - a culturally deprived group and a culturally different group (Deutsch, 2003). Culturally deprived individuals are individuals who have had no mediation or transfer of culture and learning as a result of tragic circumstances such as war and deportment. Culturally different individuals, however, are those who have received
mediation of their psychological processes but their methods may be different from the mainstream culture that they may be engaging with (Kozulin & Presseisen, 1995). Feuerstein concluded that culturally different children learn from new experiences and have high modifiability. Culturally deprived children, however, require special input to develop effective learning strategies (Deutsch, 2003). Special education, for learners with learning difficulties who may be culturally different or deprived, tends to apply a passive-acceptance approach, in contrast to SCM, which is a more positive change expectant approach (Kaniel & Feuerstein, 1989). The passive acceptance approach seems to protect the learner by providing contexts and work only at the level the learner can cope with, which seems to occur in the education system generally and not only in special education. Kaniel and Feuerstein (1989) suggested an active-modification approach for all learners, which “directs the individual towards realising his potential for change and an environment designed to bring about that change” (p.166). This process is described as dynamic.

Direct versus mediated learning.

Linked to the theory of SCM is the process by which an individual learns. Feuerstein concluded that two major avenues exist whereby an individual acquires information, namely through direct exposure or through mediated learning (Kaniel & Feuerstein, 1989; Tzuriel & Eran, 1990). Direct exposure involves the stimulus and the response, without a mediator, in the manner proposed by Piaget. Direct exposure alone does not necessarily enhance learning, and teaching must be introduced to accelerate input. Based on this, the mediated learning experience (MLE) was introduced whereby the mediator, being the more knowledgeable other, takes the child to another level through intentionally framing and focusing the learning (Kozulin & Presseisen, 1995). Here the adult frames the stimulus intentionally, affecting its frequency, order and context. Moreover, the child’s vigilance, curiosity and sensitivity to the stimulus are heightened (Tzuriel & Eran, 1990). MLE operates on two levels, one on modifying the cognitive structures and the other on transmitting the cultural values of that community (Deutsch, 2003). This is similar to Vygotsky’s ideas, for whom internalisation of learning occurs through the development of language and also through the cultural context in which that language is used. Although certain forms of everyday knowledge are acquired through direct exposure, more scientific and abstract knowledge requires mediation in the ZPD. Skuy (1996) reiterates Feuerstein’s belief that mediated learning allows a learner to be receptive and to benefit further from direct exposure. A qualitative difference is implied
between direct learning and mediated learning. The latter process is promoted in the current study.

*Mediated learning experience (MLE).*

Mediated learning experience (MLE) is an active process where the individual collates information, organises it, develops hypotheses and makes deductions (Haywood, 2008; Isman & Tzuriel, 2008). The construct of MLE provides an explanation of the conditions under which optimal learning occurs, identifying the scope of the interaction between the teacher and the child (Feuerstein, 1979). Central to the theory of MLE is the shift the child makes from being dependent on the external mediator to internalising learning, monitoring and self-regulating his or her learning, which results in transfer to distal contexts and generalisation to proximal contexts (Deutsch, 2003). Distal factors relate to the individual and the environment while proximal factors refer to the mediated learning or lack thereof. According to Kozulin and Pressisein (1995), examining the organism and the environment only will not explain the varied outcomes after mediation and they suggest that both the distal and proximal factors be observed.

Through mediation, the adult or more experienced other assists the child in developing his or her cognitive functions by means of framing and interpretation. Tzuriel and Eran (1990) point out that the adult highlights conceptual knowledge for the child, such as temporal, spatial and causal relationships within the interaction, and that it is through mediating meaning that the child acquires cognitive functions and mental operations which impact on the child’s cognitive modifiability, thereby maximising learning. The cognitive functions should lead to more effective and efficient learning across domains and should transfer to new learning (Haywood, 2008). Transfer of learning is another crucial concept further discussed by Shlomo (2001), and this is presented in chapter 4 which deals with instruction and learning. Feuerstein’s theory of MLE is therefore broader than the concept of scaffolding in an interaction, as “MLE takes into account a wider dimension of the mediational process, the various aspects of the child’s cognitive function, adult mediational strategies, tasks, and monitoring of response” (Tzuriel & Eran, 1990, p.107).

The quality of the interaction, rather than just the content of the subject matter, is an important factor to consider in MLE, as it creates successful learning. The quality is brought about by the intentionality of the human agent who interjects between the child and the
stimuli in the environment (Deutsch, 2003; Kozulin & Presseisen, 1995). The quality of the interaction also depends on the ability of the mediator to share meaning, expand on the information, and create higher levels of understanding for better generalisation to novel situations. The mediator plays a salient role in the interaction to ensure that the quality of the interaction is maintained. Feuerstein and his colleagues hypothesise that MLE is a necessary and sufficient condition to explain individual differences in cognitive performance as well as the differential development of the cognitive processes (Feuerstein et al., 1980). He formulated a set of criteria to evaluate whether an interaction was a "mediated" process or not. These criteria are dynamic and do not form a finite set. Ten criteria were initially articulated, but in recent years an additional two have been identified. These criteria are introduced and defined in this chapter and are also referred to in the intervention section in chapter 5.

**Mediated Learning criteria.**

The criteria according to Feuerstein et al. (1980) are as follows:

- **Intentionality and reciprocity:** the mediator guides the interaction in a chosen direction by selecting, framing and interpreting specific stimuli. This is intentional and the mediator actively focuses the child's attention on the stimuli so that a change in perception and processing occurs. Reciprocity refers to the rapport in the interaction between the mediator and the learner, as well as the response from the child. Receptiveness and cooperation are essential for effective application of these criteria.

- **Meaning:** this occurs when the mediator conveys the significance and purpose of the task. The mediator is emotionally involved and shows interest in the information shared, and elicits an understanding as to why that activity should be done. The mediation must be meaningful to the recipient. According to Tzuriel and Eran (1990), mediating the meaning of the activity and process, acts as a powerful predictor of effective learning.

- **Transcendence:** refers to the interaction going beyond the immediate context. It includes both the character and the goal of the MLE (Tzuriel & Eran, 1990). It is necessary so that generalisation of the process is applied to any other learning contexts.
- Competence: the mediator assists the mediatee to develop self-confidence in a given task. The perception of success by the mediatee is more important than the outcome. The task is graded to achieve levels of success, which confirms the learner and assists in developing independence.

- Self-regulation and control of behaviour: the mediatee is made aware of their need to self-monitor and adjust their behaviour so that they can manage the activity more effectively. This can be done through modelling or explicit cognitive strategies.

- Sharing: this refers to interdependence between the mediator and the mediatee. It is a mutual need to co-operate at a cognitive and at an affective level.

- Individuation: occurs when the mediator focuses on the individual, regarding his/her uniqueness and differences, celebrating differences. This encourages autonomy and independence.

- Goal planning: this involves setting, planning and achieving goals set out in a task.

- Challenge: the mediator encourages the mediatee to face challenges of new and novel tasks with determination and enthusiasm.

- Self-change: the mediator encourages the mediatee to be aware of the dynamic potential for change and to recognise its importance and value.

- Search for optimistic alternatives: the learner must be made aware to anticipate positive outcomes.

- Sense of belonging: this refers to bonding with others. It reflects the individual’s ability to move away from self-focus to accommodating others’ needs.

The first three of the 12 criteria – intentionality/reciprocity, meaning and transcendence - are universal and are key for any interaction to be classified as an MLE (Feuerstein et al., 1980). There has to be an intention on the part of the mediator; the mediation must be meaningful and able to transcend or transfer the current learning to other related areas in the individual’s life (Haywood, 1977). Deutsch (2003) maintains that even though the MLE is considered universal, the content is culturally specific. This is relevant as the criteria can be maintained, but the meaning has to be related and relevant to the respective cultural context. All 12 of Feuerstein’s criteria can be used in their entirety or a select few can be chosen as demonstrated by Deutsch (2003) and Greenberg (2000a, 2005a).
Degree of modifiability.

As indicated in the previous sections, Feuerstein’s perspective on cognitive development was an alternative view to conventional theories. He realised that even though all individuals are modifiable, the levels of modifiability will differ according to the individual, where not all individuals will respond in the same manner when learning. According to Feuerstein, some individuals - either through cultural deprivation, cultural difference, distal or proximal factors - will present with different outcomes. For intervention then to be appropriate and relevant, identification of where the breakdown in cognitive processing occurs is needed. Feuerstein and colleagues described processing as having three phases namely: input, elaboration and output, based on an information processing model (Feuerstein et al., 1980). The input phase entails the taking in of information (reception). Here the learner gathers information to solve a task. To do this, the learner needs to have adequate listening skills, good understanding of language and concepts, as well as the ability to simultaneously examine various sources of information. The elaboration phase refers to the processing of the information. Here the learner has to work on the task through defining it, comparing, integrating information, hypothesising, and systematically planning the task. It also includes the type of processing such as simultaneous, successive, top-down or bottom-up. The output phase involves the expression of the information, where the learner has to be precise and accurate in his or her presentation of the response. These phases are also impacted on by the affect and motivation of the individual (Feuerstein et al., 1980). When considering educational instruction, cognitive processing must be considered in light of affect and motivation of the individual. Assessment of cognitive processes is important for relevant intervention, and this is discussed in the next section.

Some critics of Feuerstein point out ambiguity with regard to the concept of MLE, in terms of its conceptual and theoretical framework (Frisby & Braden, 1992). Several researchers agree that intentionality/reciprocity, meaning and transcendence are key criteria, while others propose additional views on the criteria. Tzuriel and Eran (1990) indicate that intentionality must include reciprocity for MLE to be effective, whilst others make no such claims. Feuerstein’s response to such critique, however, is that according to his theory, all individuals can learn. Furthermore, the principles of MLE need to be applied within each individual’s cultural context to ensure relevance. The content can be selected to ensure that it is relevant to the learner’s cultural context. Isman and Tzuriel (2008) reported several studies that show relevance of application across age ranges and different cultural contexts. Skuy (2002) firmly
believes that, as a philosophy and belief system, Feuerstein’s work has value for education and learning across the world, and especially in South Africa. Nevertheless, ongoing research on its application across cultures and contexts is necessary in order to evaluate psychological validity and pedagogical reliability (Deutsch, 2003).

Feuerstein’s theory of structural cognitive modifiability and MLE are two of the theoretical and conceptual premises on which the present research is based, as they present a comprehensive perspective of cognitive development. Mediated learning experience (MLE) also provides a significant mechanism in promoting cognitive development in all learners, especially in the South African context. Learners with less than adequate literacy skills can become effective readers given appropriate mediational intervention. The metacognitive approach of intervention in this research made use of the MLE theory, since the interaction between the primary interventionist/teacher and the class, is believed to be essential in education. This process is further explored in the intervention section of chapter 5.

The above theories demonstrate that learners construct knowledge through both direct exposure and through mediated encounters. This acquisition of knowledge is evaluated when determining the level of functioning of the individual. Historically, assessment of an individual’s performance began with the focus on intelligence testing. A fundamental shift according to Feuerstein (1979) was required in psychometric practice to move from product to process and from existing abilities to modifiability. The intention of the next section therefore is to provide a background for cognitive processing and to indicate its value and relevance to the current study. Cognitive processing is essential for learning and is specifically relevant in this study in order to understand how text material is comprehended. This next section will indicate the processes involved in learning which have implications for modifiability.

3.5 Intelligence Measures (Cognitive Processing)

Traditional forms of assessment such as IQ (intelligence quotient), measures were originally considered as the primary means to determine cognitive functioning of an individual. This psychometric focus implied that performance was static and depended on the acquisition of knowledge. However, Feuerstein indicated that the potential of individuals was often not
reflected in the outcomes of these measures, hence their ability to learn may not be accurately reflected, and could lead to inappropriate and irrelevant intervention approaches being recommended. Vygotsky (1934/1987) also wrote that traditional methods only indicated actual development, reflecting what was already learnt, with no indication of the potential of the individual. Naglieri (1989) too maintained that cognitive processes are often underrated when tested by standardised IQ measures. Nevertheless, given that cognitive processes develop in learning, exactly what is being reflected in traditional IQ assessment measures is still strongly debated. In particular, the static perception of functioning was not accepted by some theorists who argued that intelligence cannot be viewed as a fixed phenomenon but rather as one created through social activities and constructed through social means (Feuerstein, 1979; Naglieri, 1989; Vygotsky, 1978).

Assessment needs to also indicate variables other than acquired knowledge. The potential development of the individual as indicated in the ZPD thus needed to be identified, as it is seen to be more important than actual knowledge, and this would then inform instruction. Furthermore, learning and the construction of knowledge are linked to the motivation of the individual. According to Sternberg (1988), as children mature, some appear to be more intrinsically motivated to use more complex strategies, reason better and construct better understandings. Different methods and measures are thus needed to be considered to provide more relevant data on cognitive processing ability. This applied particularly to psychology and education in the 1980s, when a paradigm shift emerged in the understanding of intelligence as cognitive competence, and the focus shifted to cognitive processing rather than focusing on a static IQ score (Naglieri, 1989). The literature reflected this shift and it was evident that cognitive processing measurements yielded promising results for both diagnostic and intervention applications (Naglieri & Gottling, 1995; Naglieri & Johnson, 2000).

**Planning, Attention, Simultaneous and Successive Processing (PASS) Theory:**
It was within this context that Das et al. (1994) formulated the PASS theory, a new conceptualisation of cognitive processing. It originated as a result of the limitations indicated in traditional IQ measures. The PASS model was also presented as an alternative to the conceptualisation and measurement of cognitive ability. It has been described as a multidimensional theory, which provides information on an individual's cognitive strengths and weaknesses in any setting (Kroesbergen, Van Luit & Naglieri, 2003; Naglieri & Johnson, 2000).
Researchers have applied the PASS theory, which is operationalised by the Cognitive Assessment System (CAS: Naglieri & Das, 1997a), to learners with attention deficit hyperactivity disorder (ADHD) and learning disabilities (LD), among others, indicating it to be a sensitive measure (Naglieri, Salter & Edwards, 2004). In addition, the CAS was utilised with 30 children with ADHD in South Africa, and the results indicated low planning and attention scores, confirming its sensitivity in different contexts (Moonsamy, 2004).

**PASS Constructs.**

The PASS theory assumes that the cognitive functions which allow learners to perform a variety of tasks can be described (Naglieri & Johnson, 2000). The four basic psychological processes are founded on the theoretical and neuropsychological framework presented by Luria (1973) and were further operationalised in the work of Das et al. (1994). The PASS model is based on Luria’s conceptualisation of the brain, where three functional units process information. Das et al. (1994) state that these three units: attention, simultaneous and successive, and planning, have distinct functions but form an inter-related system of mental processing. These units are discussed in detail further on. Naglieri (1989) postulates that these cognitive processes can be used “to understand how a child thinks, to discover the child’s strengths and weaknesses, to assist in differential diagnosis, to conduct fair evaluations and to design appropriate interventions” (p.186). As cognitive processing is fundamental to the performance of any task, discussion of cognitive processing in relation to the anatomical structures of the brain is fundamental. All cognitive processing involves these three functional systems that work in an interrelated manner even though each has a distinctive function (Das & Abbot, 1995). Each PASS construct is defined to explain what each entails, and each anatomical unit is described in terms of its function and its relation to the PASS theory. Naglieri and Johnson (2000) describe the constructs as follows:

*Planning* as a mental process provides cognitive control and development of strategies and plans, self-monitoring and self-regulation, and utilises processes and knowledge to achieve a desired goal. *Attention* refers to the mental process that provides focused cognitive activity, resistance to distraction and selective attention over time. *Simultaneous* processing allows the person to deal with many pieces of information at one time and arrange that data into interrelated groups. *Successive*
processing refers to the mental activity that allows the individual to work with information in a specific order or series (p.591).

These four processes as they operate in the brain are discussed in terms of the three anatomical units, with the first unit involved with attention, the second with simultaneous and successive processing and the third with planning. The first functional anatomical unit is responsible for regulating cortical tone and maintenance of attention. The individual can only receive and process information if an optimal waking condition is achieved. Appropriate levels of arousal also provide opportunity for specific direction of attention. Das et al. (1994) describe arousal as a state of active alertness. If this arousal unit is not working effectively it impacts on the processing process. The individual’s preparedness to organise incoming information is disrupted. If there is under-arousal, specifically planning (unit three), simultaneous processing, which is integrating information in its entirety, and successive processing, which refers to processing information serially, are influenced (unit two). If the unit is over-aroused, difficulty with selecting and responding is noted (Das et al., 1994). Therefore it can be seen that attention in unit one would impact on units two and three, affecting the child’s ability to learn.

The second unit receives, processes and stores information using simultaneous and successive information coding. Integration is not due to the modality of the incoming information but occurs at the level of unit two. Das et al. (1994) describe coding or processing in three parts, as the level of coding, the code content and the type of coding. The level of coding examines the complexity of the material presented, and the level of abstraction and inference required. Less complex material would be referred to as low levels of coding and can happen automatically. Higher levels of coding would, however, require more cognition. Code content then looks at whether the content is verbal (grammatical) or non-verbal (spatial), and is different from type of coding, which indicates how the information is processed, either simultaneously, successively or both. According to Naglieri and Das (1997a) “simultaneous processing is a mental process by which the individual integrates separate stimuli into a single perceptual or conceptual whole and successive processing is where the individual integrates stimuli into a specific serial order” (pp.4-5). The incoming information may be combined with prior knowledge from the knowledge base and is processed in the working
memory (short-term memory), which is then stored in the knowledge base (long-term memory) for later retrieval (Kyriacou, 1995).

The third unit is involved with planning, and it regulates and directs mental activity. Here the individual is provided with the means of analysing the problem, formulating a plan of action, monitoring and evaluating the effectiveness of the plan. According to Naglieri and Das (1997c), the three key stages of planning which are essential for successful outcomes are “generation, selection and execution” (p.2). Depending on the task, planning may require attention, simultaneous and successive processing. Planning is integral to all activities and the level of complexity of the task will determine the amount of planning required.

The four cognitive processes (planning, attention, simultaneous and successive), in addition to interacting with the individual’s knowledge base, are also influenced by the individual’s social and cultural context (Das & Abbott, 1995).

**PASS Theory and its Relationship to Academics.**

Psychologists and educationist attempt to link the cognitive processes of children to their academic performance as they are understood to have similar constructs. “Tests assessing cognitive and scholastic abilities should therefore correlate” (Naglieri & Rojahn, 2004, p.174). If a strong relationship exists between these two constructs, it is assumed that whatever the test measures plays an important role in academic performance. Some tests may have correlations between the tests of general ability and achievements, even though the items itself do not have academic content. Naglieri and Rojahn (2004) indicated that the CAS is such a test, where the items do have any academic skills content. Nevertheless, they found a significant correlation between the CAS and the Woodcock-Johnson Revised Test of Achievement in a sample of 1 559 students aged 5-17 years. Age was implicated as a factor influencing the relationship between ability and achievement. The relationship between cognitive processing and reading indicated an increase with age, and the hypothesis that was formulated in this regard was that “higher academic levels demanded more abstract texts, and an increasing involvement of the four PASS processes was needed” (p. 184). It is therefore assumed that the involvement of the cognitive processes is related to the construction of the test or activity.
The relevance of the CAS within education is also confirmed by its value as a diagnostic measure, where a high correlation between the cognitive processes on the CAS and achievement are reported (Naglieri & Das, 1997b), as well as promising results for intervention applications, using the CAS (see chapter 5 on intervention) (Naglieri & Gottling, 1995; Naglieri & Johnson, 2000). Even though the PASS cognitive processes correlate significantly with general achievement, the planning subtest is particularly highly correlated with maths calculations. Studies showed a high positive correlation between maths and simultaneous processing \((r = .62)\), and between maths and planning \((r = .72)\) on the CAS. This is important as it suggests that the CAS can act as an indicator for achievement in general and in maths in particular (Naglieri & Johnson, 2000). A similar study by Kroesbergen et al. (2003) looked at the relationship between maths and the PASS profile, and specifically examined whether it could distinguish between maths facts and maths problem-solving areas. The study was conducted with 267 Dutch students with maths learning difficulties (MLD) attending general or special education in the Netherlands. The Dutch version of the CAS and the multiplication tests were administered. The results indicated that students with MLD performed lower than their peers and obtained poorer scores for planning, and thereby confirmed the diagnostic value of the CAS, as in previous studies. The PASS model was also looked at within the South African context and correlations were reported between the CAS and the Woodcock Diagnostic Reading Battery, confirming its validity for use within this context (Reid, Kok & van der Merwe, 2002). Several studies have also linked the CAS processes to reading (Haddad et al., 2003) and these are discussed further in the following chapters.

A number of studies have applied the PASS model, as operationalised in the CAS, in attempts to determine its validity and replicability (Naglieri & Das, 1997a; Naglieri, 1999). These studies indicate that the CAS offers a viable alternate to traditional testing, as well as providing a good understanding of the cognitive processes involved in learning. Independent studies by Kranzler, Keith and Flanagan (2000) with children from general education classes with no special education services, have nevertheless, concluded that the CAS lacks structural fidelity, and that it does not measure what its authors intended it to measure, which is differential diagnosis for planning educational intervention based on the PASS scales. They indicated that a three-factor model be implemented, joining planning and attention together. As structural fidelity is a necessary but not sufficient condition for construct validity, these results have been noted and further studies are needed. Naglieri, Goldstein, Iseman and
Schwebach (2003), however, disagreed with Kranzler et al. (2000) regarding the three-factor model ([PA] + SS), based on the findings from their study. Naglieri et al. (2003) examined the differences in cognitive performance between 25 children with ADHD, 25 children with anxiety/depression and 25 children in the normative group, and found that children with ADHD performed significantly poorer than the other two groups on planning. Their study illustrated a large effect size for planning but not for attention, confirming that planning and attention should be considered as two independent constructs. They argued that the differentiation between planning and attention has theoretical and practical implications. However it is noted that the samples in their studies were small, hence these findings may not be generalisable. In a study by Puhan, Das and Naglieri (2005) it was shown that planning and attention were separate, and thus the three-factor model showed little or no difference to the original four-factor model (PASS), suggesting that Kranzler’s claim was not necessarily valid.

The PASS theory as described by Das et al. (1994) highlights the processes involved in all tasks, including reading comprehension activities and verbal discussion, which were assessed in the current study. The intervention, although not directly linked to the PASS profile of the sample, included the metacognitive strategies for planning, selective attention and thought integration. The theories that provided the cognitive conceptual framework for this research were presented in order to firmly ground the intervention genre selected in this study. The theories of SCM, social learning, MLE, and cognitive processing, as explained in the PASS model, provided the foundation on which the effective mediation in the ZPD was implemented in the classroom. This is described in detail in chapter 5 that covers metacognitive intervention.

Having discussed the first study variable of cognition, relevant theorists and the PASS model, the second variable of language and its development are now examined, as well as their links to cognition, as these variables encompasses the two major higher order mental functions. For effective learning to occur, these two functions need to be understood in relation to each other, as well as to learning. Language is the focus of the next section which will be linked to the theories mentioned above and will be presented briefly in terms of its link to cognition, and its importance is demonstrated in relation to language of the older or school-aged child.
3.6 Language and Cognition

The debate regarding the nature of the relationship between language and cognition still continues. It is argued that despite the cognitive or the language hypotheses discussed in the literature, language and cognition are equally important with each influencing the other's development. Witt (1998) maintains that these entities are so intertwined that you cannot discuss one without discussing the other. The interactionist theory reconciles the cognition and language debate. According to this theory, language and thought emerge relatively at the same period, impacting on and facilitating each other’s development (Highnam, 1994). Evidence also suggests that language and thought are merging relationships as the child matures, and which can be seen in the early school years when children are exposed to literacy skills and semantic organisation (Witt, 1998). Even though semiotic mediation of higher levels of thought and action is a central principle in Vygotsky’s theory, several theorists often neglect the influence that language has on cognitive development (Nelson, 1996).

*Language and learning in the school-aged learner:*

The language abilities of children continuously change and are refined in the school years (Westby, 1998). Naremore, Densmore and Harman (1995) argue that the language of children must be understood in relation to the demands of their communication context. It is assumed by teachers that learners enter school with an established foundation in language which influences their approach to learning and literacy acquisition. Often the assumptions of what the child knows when entering school may contribute to poor reading outcomes. Based on this premise, teachers need to be aware of learners with English Additional Language (EAL), and their level of acquisition of the language of learning and teaching (LoLT). It is also important to understand the knowledge that learners bring to the task and the requirements of the school curriculum. According to Westby (1998), for the learner to be successful, the language of the academic lesson must be within his or her ZPD.

Owens (2005) states that the basic rules in language are generally in place at the start of formal schooling but exceptions to this assumption are often discovered during the school years. As learners develop flexibility and competence in their language system, better skills in abstract language emerge. In addition to semantics and syntactical development, the school-aged learner refines his or her pragmatic skills, which refers to the social use of
language, as this is fundamental to learning in the classroom (Norris, 1998). Pragmatic skills are discussed further as they relate to metalinguistics and metacognition, and are linked to the present study. Furthermore, school-aged learners need to apply the skills described in Bloom’s taxonomy, i.e. to analyse, synthesise, evaluate, recall and comprehend information, in order to function in an academic context (Anderson & Krathwohl, 2001). Westby (1998), however, argues that learners need to do more than just memorise and repeat information, but need to use language to think.

Pragmatics:
According to Norris (1998), pragmatics, which is a set of sociolinguistic rules related to language used within a communicative context, is important for applied situations such as classroom learning and teaching. “Pragmatic knowledge includes understanding the communicative function of language and the conventions that govern the use of language in order to communicate” (Hoff, 2005, p.242). The learner has to display appropriate skills in order to engage in conversational, narrative and expository discourses. These discourses are important for learning, specifically in the classroom context.

Norris (1998) cites Grice’s (1975) four maxims that learners need to adhere to in conversation, namely: quantity (appropriate amount of information for the content to be understood), quality (providing reliable information), relevance (the information must be responsive to the topic being discussed) and manner (the speaker must present information taking into consideration the listeners’ perspective and use appropriate turn-taking (p.19). These maxims allow for successful sharing of information with minimal disruption to understanding the message. Moreover, the learner needs to understand when breakdowns in communication occur so that communication repairs can be carried out to achieve comprehension. Pragmatics is therefore an essential skill in metacognitive intervention, as the learner requires these foundations to engage in verbalisation of his or her thinking, sharing of information with fellow classmates and responding to the teacher.

Metalinguistics:
In addition to enhancing their language proficiency, learners are introduced to literacy, a new mode of communication, in the first two years of schooling. This also increases their potential to interact with several communication partners, such as authors and other readers, when engaging with the text (Owens, 2005). For literacy to develop effectively and to transfer into
successful learning, learners require knowledge and skills in language awareness or metalinguistic skills, inferencing and cohesion. Metalinguistic abilities, in addition to schemata of prior knowledge, which are further independent of comprehension and production abilities, form the foundation for language awareness (Baran, 2007; Owens, 2005, 2010). Metalinguistic skills refer to the ability of reflecting on the phonemes, which assist in segmenting linguistic material (Lane, Pullen, Eisele & Jordan, 2002). Baran (2007) indicates that metalinguistic skills include thinking and reflecting on language, as well as analysing the language structure and synthesising the information to provide coherence. Metalinguistics does not emerge in isolation but is dependent on the interrelatedness of the language components (that is: syntax, semantics and pragmatics) and cognitive skills. Metalinguistic awareness can be described as perceiving language as an object that can be analysed.

Metalinguistic awareness can be related to cognitive processing, especially to centration. This refers to the child being able to manipulate two ideas simultaneously as well as syntax and meaning when reading (Naremore et al., 1995). Furthermore, metalinguistic skills impact on semantic organisation, which is particularly significant when the demands of the curriculum change and higher levels of comprehension are required. As learners mature, they use their metalinguistic knowledge in sophisticated ways to engage with language. They are able to judge, predict, use language appropriately, reflect on basic and higher order information, and consider alternative solutions to problems (Baran, 2007). They also use these skills to analyse and explain ambiguities. The learners in the later grades should be capable of applying these skills, as they focus and reflect on the language in a decontextualised manner. Owens (2005) refers to this as “linguistic intuitions”, which assist speakers in monitoring their expressive language and making the necessary repair (p.379). It is evident that rapid parallel development occurs in cognition, language and metalinguistic skills during the school years. Therefore learners who experienced difficulty with their early development of language and cognitive skills are likely to have difficulty acquiring reading and writing skills due to the common cognitive linguistic base involved in the process (Bashir et al., 1998; Nelson, 1988).

**Metacognition:**

Another ability linking cognition and language is the concept of metacognition. This refers to the ability of individuals to reflect on their thinking that is, thinking about thinking (Flavell et al., 1993). Metacognitive ability is evident at ages 11-12 years, and learners at this age,
according to Piaget, are capable of engaging in the formal operational thinking required in schools for learning. This was taken into consideration in the present study and Grade six learners (aged 11-12 years), that is, intermediate phase rather than foundation phase learners, were selected as participants. Metacognitive instruction, which requires abstraction of thought, is hypothesised to be effective in intermediate phase learners, as they are able to reflect on language in a decontextualised manner, using their metalinguistic skills to verbalise their thoughts (Baran, 2007; Owens, 2005). Metacognitive skills allow learners to actively engage in their learning, and produce better transfer to other learning situations than when mechanically applying content-based strategies (Campion, 1987). It is believed that learners who have difficulties in reflecting on their skills and their thinking are unable to show their true potential to achieve. Metacognitive strategies thus focus on the processes of learning with consideration of the content of the material used in the activity. Metacognition and its relation to the intervention included in this study are discussed further in chapter 5.

3.7 Development of Literacy: Its Link to Language and Cognitive Processing

As discussed earlier, it can be seen that learners require a foundation in oral language, metalinguistic and metacognitive knowledge, as well as cognitive processing for efficient literacy development. Although both reading and writing are part of literacy, only the process and the development of reading are considered for the purpose of this study.

The Process and Development of Reading:

Reading was identified as an important cognitive process as early as the 1900s (Brailsford, Snart & Das, 1984). It involves complex cognitive processing and the decontextualised use of language where the reader creates the context through language. This active process requires the reader to process print, select, encode, store and retrieve information from the reading material and from his or her own cognitive structure. Das (2001), who was influenced by the work of Luria, considered the reader as a processor of printed information. Luria (1966) observed that both simultaneous and successive mental codings are used in every processing activity. As defined earlier, simultaneous coding or processing refers to the ability to organise and synthesise individual information into a system of relationships, while successive coding is defined as the ability to assimilate information in a serial, temporal order or sequential manner (Chow & Skuy, 1999). With regard to these definitions, as well as Luria’s
assumption that both types of coding are typically involved in cognitive processing, it can be
said then that readers require both simultaneous and successive coding for processing
meaning when reading.

According to Owens (2005), there are two major ways in which information is processed
when reading - the bottom-up and the top-down approaches. In the bottom-up processing
model, readers use phoneme and grapheme correspondences to decode print. This is
described by Churches, Skuy and Das (2002) as successive processing. Word reading
requires the processing and retention of serially ordered information for effective decoding.
Metalinguistic knowledge assists the learner to make easier transitions into reading using the
bottom-up processing model. In contrast, the top-down processing model assumes that the
reader uses language and conceptual knowledge to recognise words sequentially to make
meaning (Brailsford et al., 1984). Using this approach, the reader requires higher order skills,
including metacognition to construct meaning. This relates to the reader using simultaneous
processing where the holistic view is considered. Good integration of information from
various sources is fundamental in developing the appropriate mental schema (Chow & Skuy,
1999). Bottom-up processing may explain some of the difficulties readers have with
decoding, as it reflects sequential processing, while top-down processing reflects both
simultaneous and sequential processing (Das, 2001).

Like other psycholinguists, Owens (2005) believes that reading involves both bottom-up and
top-down processes, which provide information simultaneously and sequentially at various
levels of analysis. As readers mature and their reading skills are better established, top-down
processing is preferred, and skilled readers only rely on bottom-up processing when a new
word is encountered. This type of reading is expected at Grade six, and top-down processing
skills are assumed to be in place as reading would have been introduced in the foundation
phase in South African schools. Once the process of decoding becomes automatic, the reader
should be able to focus on the meaning of the text. It is thought that comprehension will
occur if processing capacity is sufficient. According to Bishop (1997), when readers
comprehend text, a mental representation is created and, like a puzzle, the pieces are
integrated. Kamhi and Catts (1991) agree that learners construct meaning by bringing their
world knowledge, cognitive and language abilities to the text that they are engaging with.
This process is discussed further in the next section, whereby readers form hypotheses.
throughout their interaction with the text and continually change the mental representation they create, integrating relevant information until meaning is achieved.

**Development of Reading Comprehension:**
The main aim of reading is to gain meaning from the text (Gajaria et al., 2007). To achieve this, readers have to have several prerequisites in place such as word decoding, cognitive processing, language competency, a knowledge base, text genre, and instructional discourse (Churches et al., 2002). In other words, reading comprehension cannot be viewed in isolation from other cognitive processes and these skills therefore need to be examined in order to present a holistic view of comprehension (Cain & Oakhill, 2006).

When learners transition from the foundation phase to the intermediate phase in South African schools, it is presumed that they have moved from learning to read to *reading to learn* (Gajaria et al., 2007; Snow, Scarborough & Burns, 1999), and are able to comprehend what they read. Comprehension has been described by Catts (2009) as one of the most complicated mental activities individuals engage in. For learners to be successful in comprehending text, several complex thought processes have to be accessed and applied, including reasoning, synthesising, problem-solving and interpreting. Lubliner (2004) suggests that difficulties in reading comprehension are more evident in the higher than in the lower grades due to the increase in language complexity. This is supported by teachers who add that proficient reading at the intermediate phase entails a broad array of cognitive and linguistic skills, including vocabulary, topic knowledge, memory, ability to draw inferences and awareness of purpose. Additionally, intact reading skills, an appropriate attitude and motivation, as well as metacognitive and metalinguistic skills are necessary for effective literacy development (Cain & Oakhill, 2006; Catts, 2009; Culatta, Horn & Merritt, 1998). These requirements are discussed further but are not presented in any particular developmental sequence.

**Background knowledge and inferencing.**
Cromley and Azevedo (2007), and Harris (2003) indicate that background knowledge has been recognised as a fundamental skill which has a direct effect on literal comprehension, inference, word decoding, vocabulary, application of strategies and test performance. Das (2001) further defines world or background knowledge as “knowledge of self, of personal history, past learning and culture, and inferences and reflections” (p.54). The use of
background knowledge is central to our thinking when reading. Harris (2003) maintains that readers with good background knowledge do better than readers with limited background knowledge. A reciprocal relationship thus exists between reading comprehension and background knowledge, and this is implicated in the study by Cain & Oakhill (1999, cited in Cain, Oakhill, Barnes & Bryant, 2001). The readers in their study displayed intact lower order skills such as word decoding but had difficulty with reading comprehension as a result of poor inferencing skills. Inferencing skills were indicated as a central component for effective comprehension. Readers require access to their store of long-term memory knowledge to be able to make inferences. A prior knowledge base is therefore an important source in a reader’s repertoire. The poor readers in Cain and Oakhill’s study showed difficulties in selecting relevant information on which inferences were to be based. Their study indicated that an ability to select information relevant to making inferences and an easily accessible bank of background knowledge are fundamental to good comprehension. The reader forms a coherent representation of the text as a result of combining background knowledge and the information in the text.

Vocabulary or lexical development.

Improved comprehension also depends on the growth of learners’ lexicon. This, according to Gersten, Fuchs, Williams and Baker (2001), is not just prior knowledge but includes knowledge of academic terminology. Skilled readers acquire more lexicons from texts, adding to their developing mental dictionary of words and their meanings. They are able to link new knowledge to prior knowledge as they are familiar with the terms in that subject domain. Catts (2009) argues that content knowledge must be related to the subject taught so that it is relevant for the learner, which therefore has implications for instruction.

Cohesion.

Comprehension is also assisted by levels of cohesion in the text, as well as the explicitness of the text (Owens, 2005). As comprehension entails getting at the meaning of sentences, knowledge of syntactic and semantic cues is used to predict the text (Das, 2001). Here the reader uses parsing, which is the analysis of the grammatical sequence of words in a sentence, and semantic cuing, which involves extracting meaning based on contextual clues (Scott, 2009). Parsing needs to work at an automatic level so that the pace of comprehension does not detract from developing meaning. This is accomplished by linking syntactical knowledge to previous experience the learner brings to the text. This again confirms that
background knowledge is central to comprehension. The reader who is able to use parsing effectively, will be able to comprehend sentences which have embedded meanings and contain propositions, which are more complex sentences, frequently found in expository texts. In the Intermediate phase, subject content is expository in nature and therefore requires application of parsing. Effective comprehension also depends on connections among the macrostructure (story grammar of the text), the microstructure (cohesive ties in the text) and the suprastructure (world or background knowledge) (Culatta et al., 1998; Owens, 2005). This confirms that a combination of text factors is required for comprehension.

*Text genre.*

Learners often have difficulty engaging with text as it is not as interactive in the manner that conversational discourse is, and it also does not have a shared context. Meaning is not negotiated, but is presented by the writer in the language used. When clarification is required, it may be indicated by paraphrasing or redundancy (Naremore et al., 1995). Researchers maintain that readers therefore have to understand the conventions of text to comprehend effectively. The type of text encountered in the intermediate phase of education is fundamental to the literacy performance of the learner. Learners are required to engage with two types of text genres at school, namely narrative and expository text (Merritt, Culatta & Trostle, 1998). Initially, narrative texts are predominant, but late elementary school requires mastery in expository texts (Westby, 1998). Narrative activities include stories read to learners, as well as their own reading of narrative text. The skill of making predictions, analysing and recognising relationships begins with social experiences at home which translate into a knowledge base required when reading text (Merritt et al., 1998). “Storying” or constructing a story in the mind is fundamental to creating meaning and is essential in comprehension. Readers manipulate the information in their working memory during the processing of the text, refer to their stored background knowledge and construct a mental representation to achieve meaning (Meneghetti, Carretti & De Beni, 2006).

Narrative text requires the learner to have an understanding of story grammar, which refers to the coherence of the content as well as to cohesion, which ties the sentences in terms of complexity and abstraction (Owens, 2005). In contrast, expository text is more complex in structure as it uses abstract language, complex sentence structure and specific terminology related to the content of that subject matter (Gajria et al., 2007). Therefore, the narrative knowledge base is essential to school success as it creates a bridge between narrative and
expository text, developing literacy (Merritt et al., 1998) as learners move from contextualised to decontextualised forms of language. According to Gersten et al. (2001), readers with a good narrative structure knowledge transition into expository text better as they expect this text to have some structure. Learners are likely, however, to have more difficulty with expository texts, as the discourse style requires more complex cognitive processing (Gajria et al., 2007).

Expository texts are generally recent introductions in the curriculum for 11-to 13-year-olds, requiring greater abstraction, generalisation and specifically knowledge demand for scientific academic content. As expository text structure is less cohesive, learners require wider world knowledge, deeper cognitive processing and working memory capacity for easier access to meaning (McNamara, Floyd, Best & Louwirse, 2004). However, knowledge of text structure leads students to ask relevant questions about the material as they read and this assists with comprehension (Gersten et al., 2001). Learners who approach expository text with good text structure knowledge have a plan of action, and they chunk and organise information resulting in better retrieval and higher recall. In addition to text structure, strategy use also needs to be considered.

_Cognitive Processing abilities._

The cognitive abilities of the learner as discussed earlier influence comprehension of the text read (Cain et al., 2001). The reading process is an active process and requires planning, attention, simultaneous and successive processing (Das, 2001; Das et al., 1994). The reader has to selectively attend to the material, holding it in his or her working memory, while deciding on what is relevant and what is not, to build a mental representation. In addition, Catts (2009) maintains that the reader needs to be motivated and to deal with his or her emotions in order to achieve good comprehension.

The reader who has poor listening and reading comprehension abilities may have insufficient vocabulary, poor understanding of syntax, as well as a difficulty in one or more cognitive processes. Simultaneous processing may be particularly poor but successive processing and planning may also not be effectual (Das, 2001). This can be further demonstrated in the study by Chow and Skuy (1999), where the two subtypes of learning disabilities, namely nonverbal (NVLD) and verbal learning disabilities (VLD), are discussed. They indicate that the NVLD group had difficulty considering the whole picture in a task, as well as poor integration and
simultaneous processing skills, which influenced their development of mental schema required for comprehension. Kirby and Robinson (1987) concur that NVLD learners have difficulty with reading comprehension as they fail to recognise conceptual relationships and patterns of ideas between variables in a task. According to Das (2001), simultaneous processing plays a key role in the development of advanced levels of reading and reading comprehension. It can be argued then that the problem of comprehension becomes more evident in the intermediate phase as higher reliance on simultaneous processing is required for more abstract tasks like expository text.

*Working memory capacity.*

Working memory is another cognitive process that has been implicated in the reading comprehension process. Baddeley (1996) describes working memory as a “limited capacity system that is capable of storing and manipulating information that is assumed to be integral to the human memory system” (p.13468). Working memory has been described as having three subsystems, (a) the phonological loop, which deals with acoustic information, (b) the visuo-spatial sketchpad, which processes visual and spatial information, and (c) the central executive, which is assumed to be responsible for the attention control of the working memory. Baddeley (1996) indicates that working memory is involved in complex cognitive tasks, including reasoning, comprehension and learning.

A study by Kibby, Marks, Morgan and Long (2004) explained working memory abilities in 20 children with reading disabilities and 20 children without. Their results indicated that the children with difficulties in reading displayed an impaired phonological loop but intact visuo-spatial sketchpad and central executive functioning when compared to the control group. Due to the small sample size in Kibby et al., (2004) study, results need to be interpreted within that study context and can therefore not be generalised. Poor readers have difficulty storing verbal information whether presented orally or in print. Scott (2009) indicated that poor performance in decontextual sentence comprehension tasks may be related to a weakness in verbal working memory rather than linguistic knowledge. For example, in a “following directions” task, the reader or listener has to hold the sentence in his or her mind long enough to manipulate it in order to follow the directions of the instruction. Information, especially in the phonological loop, could be forgotten if not rehearsed. Therefore length of sentences and complexity of text can be affected by working memory capacity, thus influencing comprehension.
Language competency.

The reader’s competency in the language of the text also influences reading comprehension. A study by Olofsson and Niedersoe (1999) concluded that even though language forms the basis of reading, reading once introduced, also influences language as it is a specific and coherent skill. The strength of learners’ comprehension of the text is therefore based on their language skills and general knowledge. It can be hypothesised that competency in English among EAL learners does influence their comprehension skills; however, EAL status by itself does not result in poor literacy levels. If EAL learners are continually exposed to the phoneme patterns of English orthography, they readily attain these abstractions. Second-language learners require 5-7 years to be proficient enough in their second language to use it in a decontextualised manner (Owens, 2005, 2010). The sample of participants selected for this study, therefore, had to have a minimum of five years of exposure to English as their LoLT to ensure that the fundamental skills had been introduced, and reading comprehension would not necessarily be compromised.

Given the knowledge and skill requirements for reading comprehension, some children continue to have difficulty when they transition from narrative to expository text. This is frequently observed in learners moving from the lower to the higher grades (Massey, 2003). Brozo (2005) refer to this period of difficulty as the “4th grade slump”, and this occurs with most children across the world. This is as a result of the increased complexity of the linguistic and cognitive demands at this stage of education, as well as having expository text introduced at this level. Gajria et al. (2007) add that less skilled readers display poor strategies with regard to text recall, identifying the main idea, actively monitoring their comprehension, extracting text and understanding expository text structure. Traditional methods have focused too frequently on reading comprehension strategies and have neglected content knowledge. Furthermore learners progress differently in their reading comprehension skills and may not all benefit from the knowledge and skills in the same manner.

Literacy success, as described above, depends on various factors. Despite the amount of time allocated for comprehension skills within the classroom, there is still room for improvement (Barton & Sawyer, 2003). The assumption can thus be made that appropriate instruction for reading comprehension may be beneficial for all learners and not just for learners with performance difficulties. The type of instruction is important to the performance outcomes of the learner. Explicit instruction to enhance comprehension skills is seen as fundamental for
the learner. According to Eilers and Pinkley (2006), learners require explicit instruction in reading comprehension in order to be effective readers. Despite research indicating that instruction in metacognitive strategies improves learners' reading comprehension skills, Eilers and Pinkley (2006) point out that instruction in reading nevertheless continues to focus on the text content. Metacognitive instruction, therefore, has a definite place in the pedagogy of the classroom and in reading instruction, specifically. This is discussed in depth in chapter 4, dealing with instructional discourse. The complexity of reading comprehension cannot be underestimated. According to Kamhi (2007), since comprehension is not a skill that can be taught through comprehension strategies, instructional implications must therefore be considered. The current study consequently used classroom based content combined with metacognitive strategies to promote thinking in comprehension. The type of instruction used should involve the learner, the teacher, the setting and the curriculum (Das, 2001). From the preceding discussion, it can be argued that the type of instruction in class has a major impact on the learner and on the process of learning to read.

3.8 Summary of Cognitive and Language Processing

In this chapter, cognition and language, which form the pillars on which effective literacy skills develop, were discussed. Furthermore, instructional classroom discourse was included as construction of knowledge allows for learning to occur. Cognitive theorists such as Piaget, Vygotsky and Feuerstein were presented as their theories form the underlying base for this intervention study. Each theorist was discussed in terms of his contribution to cognitive education. Additionally, their perspectives linking language and cognition were examined. The conceptualisation of cognitive processing by Naglieri and Das (1997a), using the PASS theory was discussed as well as the link between cognitive processing and reading. Piaget's model of development, where children adapt to their environment through the processes of assimilation and accommodation, was presented. These mental structures change with time, and through active participation shifts in understanding are created, and the importance of thinking with regard to learning is indicated. Piaget saw development as progressive transformation, differentiation and integration. His contribution to understanding cognitive development in children cannot be underestimated even though the literature points out that social and cultural concepts and their influence on learning are not sufficiently examined in
his model. The theorists that followed him added further in-depth understanding of these concepts.

The second theorist, Vygotsky, was examined in terms of his socio-cultural theory and instruction to learning, as well as his perspectives on language and cognition. He believed that the mental processes of an individual develop through social interactions and are culturally transferred. His notion of the ZPD has significantly contributed to education, as it indicates the direction of future learning whereby the learner moves from interdependence to internalisation. It also implies potential development and this has significance for many learners in the South African democratic dispensation. The human mediator, using language as a tool in their social interaction with the child, was highlighted. Vygotsky’s work therefore has significant implications for classroom instruction and learning. The third theorist discussed was Feuerstein since his theory of SCM and criteria for MLE were incorporated into the theoretical framework of this study. Furthermore, the PASS model of cognitive processing by Naglieri and Das was seen as relevant to instruction.

These theorists and their contributions to cognition are important when attempting an understanding of language development and instruction in the classroom. Language skills in the school-aged child are refined, with pragmatics, metalinguistics and metacognition emerging as essential foundations for literacy development. Catts (2009) describes reading comprehension as a complicated mental activity as several thought processes of reasoning, synthesising, problem-solving and interpreting are included. In addition, for the reader to unlock the meaning of the text, background knowledge, inferencing skills, cognitive abilities, working memory capacity and language competence are required together with knowledge of vocabulary, cohesion and text genre. Given the requirements for successful comprehension, the reflective instruction in the classroom with regard to reading should be the main focus, but content-based strategies without metacognitive instruction are often presented in classrooms. Campione (1987) indicates that content-based strategies are insufficient and explicit teaching of metacognition is thus necessary for effective learning.

Eilers and Pinkley (2006) confirm that explicit instruction in reading comprehension is required for success in literacy. Cognitive and metacognitive strategies have been suggested as being beneficial, and the DoE in South Africa has stipulated these processes in the description of learning outcomes (LO) 5 - thinking and reasoning (DoE: RNCS, 2002). Even
though metacognition is implied in the curriculum, studies have shown that teachers fail to demonstrate or teach children reflection of thought (van der Walt & Maree, 2007). This type of strategy requires that the instruction moves from a traditional approach to a more collaborative/constructivist approach. The interaction between the teacher and the learner creates meaning of the text and thereby learning is facilitated. This interactive participation of the learners, the teacher and the text may have far-reaching consequences with regard to raising the standards of literacy in South African schools.

The subsequent chapters on teaching and learning, and metacognitive intervention will discuss this instructional approach further, and also examine its link to reading. Local and international studies and their contribution to cognitive education will be explored. Additionally, the metacognitive intervention model used in this study will be delineated.
Chapter 4: Instruction and Learning
Vygotsky saw instruction as “the heart of learning development” and learning as “the capacity to learn through instruction.”

Wood, 1995, p.9

4.1 Introduction

Instruction and learning influence the outcomes of learners in the classroom context. This interrelationship of instruction and learning is indicated in Vygotsky’s view of development. Kyriacou (1995) also argues that active learning and the quality of the instruction are complementary, and should not be seen as separate constructs. According to Feuerstein and Falik (2010), there is an implicit assumption in the academic curriculum that learners will acquire learning processes to respond to instruction, which they will then use to acquire further knowledge, generalising their learning to other contexts. Erikson (2007), however, believes that the teacher has a major responsibility in assisting learners in acquiring these learning processes, so that through instruction the learners will develop into thinking individuals, geared to function in the global village. It is necessary therefore to have an understanding of the type of instructions that the teacher or the primary interventionist provides, as well as how the learner receives this instruction in order for effective learning to take place. This chapter discusses instructional discourse, implications of instruction for learning and more specifically the metacognitive instruction selected in this intervention study. Instructional discourse is discussed in terms of its definition, current applications in schools locally and internationally, factors that influence transfer of learning, and the recommendation for cognitive education.

4.2 Instructional Discourse in the Classroom

Effective learning is the ultimate goal for learners, where application of knowledge, understanding and skill to novel situations is achieved. This, however, is not an automatic process, and not all learners realise this assumption as the processing skills for each individual is
different. Instructional discourse, which occurs within classroom contexts, needs to be explored as it forms a crucial framework for effective learning. The teachers and the learners are the participants in the classroom context, and their expectations and contributions influence the learning outcomes. An understanding of what defines classroom instructional discourse is thus central to contextualise what is currently being applied versus what is recommended for effective learning. The definitions presented below are the perspectives of some researchers. In addition, instruction and learning are examined in relation to the South African education system, as it contextualises the current intervention study. This chapter relates to the curriculum and education in South Africa as presented in chapter 2, as well as to the cognitive and metacognitive intervention presented in chapter 5.

4.3 Definition of Instructional Discourse

Merritt, Barton and Culatta (1998) describe instructional discourse as “dynamic and diverse talk” (p.143) and they state that instructional discourse is a constant in any productive classroom. According to Halliday and Hassan (1996), discourse is a set of utterances, which are combined in a cohesive way to convey a unit of meaning. It can therefore be assumed that instructional discourse in the classroom is a dynamic and meaningful exchange of learning between the teacher and the learners. The purpose of this interaction is to enhance knowledge, develop comprehension and skill, and achieve academic success. Several types of discourses occur in classroom teaching and are built into the curriculum, such as explanations, definitions, presentation, procedures, conversations, narrative and expository discussions (Merritt et al., 1998). The learners and their teachers participate in classroom discourse during direct instruction, class discussions and group activities. Kyriacou (1995) emphasises the fact that the quality of the instruction is important in order to enable change in the learning process. This refers to the “extent to which the instruction makes it easy for the pupil to achieve the intended outcome” (p.27).

The quality of the instruction then and not just the instruction should be considered. Feuerstein et al. (1980) also added that the quality of instruction is what distinguishes whether mediation is
present or absent in any interaction, and this was discussed in detail in chapter 3 on cognition and cognitive theories. The “talk” engineered in the classroom therefore has paramount influence on the learning that takes place, and it needs to be conceptually driven so that thinking is promoted. When challenges of different levels of needs among learners are encountered, the instruction is often reported to be focused on “teach to the middle”, which implies that the specific needs of some learners may not be met (Merritt et al., 1998). This is a constant reality in South African classrooms according to anecdotal reports from teachers (teachers, personal communication, 2008). In addition, learners with diverse skills may not access their cognitive skills effectively in traditional classrooms, as research indicates that traditional methods do not encourage reflective thinking (Resh & Kramarski, 2007; van der Walt & Maree, 2007). Metacognitive instruction, of the type promoted in this study, is hypothesised to create awareness in learners of their cognitive abilities when learning.

4.4 Types of Instructional Discourse

The instructional discourse, which forms the framework in the school context, can be described as being either traditional and conventional, or progressive and collaborative in its presentation. Traditional instruction involves teachers presenting the information in monologues with little participation from the learners. Conway and Hopton (2000) see the role of the traditional teacher as an expert, imparting knowledge to learners without considering previous knowledge and attributes of those learners. Brady (2006) describes traditional schooling further, where the teacher is an instructor, who provides knowledge and intellectual development, emphasises discipline and prepares students for the future. All too often, the ineffectiveness of the instruction in traditional and conventional methods is not explored, and ineffective learning outcomes are linked to inadequacy in the learner (Grösser, 2007). This reflects a medical model paradigm where the problem identified is seen as being within the individual. Greenberg (2005a) adds that such traditional instruction is no longer effective for learners who are required to engage in a global society.
Traditional instructional classes also focused mainly on the content of the curriculum, as certain criteria set in the syllabi for each grade have to be covered. Learners who are engaged only at the content level focus on the “what” of learning, which does not allow them to develop strategies that can be used in new learning situations. Content-based systems don’t assist in the transfer of learning strategies but rather reflect the knowledge at the input (avenue received) and the output (learner’s performance in assessment) phases. There is thus no evidence of the elaboration or processing which occurs during learning. Grösser (2007) argues that a focus on the learner’s capabilities and not on the classroom instruction per se considers teaching and learning as two separate entities. The purpose of the study by Grösser (2007) was to determine the extent to which teachers were assisting learners to acquire the reflective learning functions of planning, monitoring and evaluating needed for effective learning. It was an exploratory, quantitative design, conducted in three schools with 82 teachers in a Gauteng district of the DoE, South Africa. The findings indicated that teachers did not link their teaching to learning functions, confirming the assumption of teaching and learning as two separate entities. This is antithetical to the approach of the present study, where it is believed that a reciprocal relationship should exist between the teacher and the learner. This collaborative interaction and the type of instruction presented have enormous implications for learning outcomes and this is explored further below.

In contrast to the traditional method, a collaborative or progressive method is one where the teacher scaffolds the learning to construct meaning, and thereby establishes better understanding among the learners, thus achieving effective classroom instructional discourse. Collaboration has been a more recent term which focuses on a learner-centred process rather than one that is teacher-directed. However, the notion of learner-centeredness does not mean that the teacher’s role is reduced. On the contrary, it requires a higher quality of instruction. Therefore to explore effective teaching, the notion of constructivism needs to be considered as it is fundamental to collaborative learning success. According to Kumar (2006), collaborative instruction and constructivism imply that learners construct their own meaning through active engagement with the teacher, in the lesson. Moreover, constructivism encourages learners to actively process knowledge, link it to previously assimilated knowledge and make it theirs by constructing their own interpretation. Owens (2005) agrees that the learning that develops from linking new to
existing knowledge expands the learner's knowledge base, and this is possible in a collaborative process.

Several questions arise in collaborative models of instruction and which relate to the role of the learner, the teacher, and the context in which the interchange happens. The collaborative models are based on the theories of Vygotsky (1978) who believed that knowledge is internally constructed as a result of the dialogue with others and the context in which learning occurs. Teachers understand the notion that learners acquire, retain and recall informational content more effectively when they engage in coherent instructional exchanges that activate comprehension (Merritt et al., 1998). Moreover, Naremore et al. (1995) indicate that instructional discourse should facilitate learning as teachers and learners create meaning through verbal interaction with each other, and when understanding of the knowledge is consolidated, transfer to other learning situations takes place. Active learning time is argued to be more than simply being focused on the activity. It takes into account the active mental engagement of the learner with the task at hand, as well as linking it to the quality of the mediation or instruction.

4.5 Instructional Explanations and Definitions

For the purpose of this research, instructional explanation and definitions refer to the method of instruction used in the metacognitive intervention, as they are the most frequently used methods for teaching (Merritt et al., 1998; Wittwer & Renkl, 2008), as well as being the instruction method for the metacognitive intervention in this study. The other forms of instructional discourse, as defined by Merritt et al. (1998), are clearly important in learning but they are not elaborated on in any detail as they do not form the focus of the present study. Instruction, mediation and teaching refer to the same concept, and are used in this thesis interchangeably. Instructional explanation and definitions which are commonly used as a strategy in the classroom are referred to as such because their intentional purpose is to teach new information. An inquiry to gather more information in any domain results in instructional explanation, which sometimes results in understanding and at other times results in further questioning (Wittwer & Renkl, 2008). However, little is known about instructional explanation in educational research.
Instructional explanations and definitions are discussed in view of their process and design, as well as in view of their influence on learning.

4.6 Process of instruction

Language and literacy are foundational skills, and are prerequisites for learners to perform effectively at school (see chapter 3). To promote cognitive and language skills, teachers utilise instructional explanations when introducing new concepts. Wittwer and Renkl (2008) maintain that learners require explanations to assist them in understanding knowledge introduced in any new domain so that schemas can be constructed for learning. In this intervention study, the primary interventionist used instructional explanations, definitions and analogy as the concepts in the Cognitive Enrichment Advantage (CEA) (Greenberg, 2000a) metacognitive strategy programme were new, and were introduced for the first time to the participants. In addition, by using analogy, new learning was linked with prior knowledge so that interrelationships between concepts were understood. Erikson (2007) states that concept-based instruction influences retention and deeper levels of understanding of the concepts introduced, which in turn impacts on the motivation of the learners. Once the new metacognitive concepts were introduced in this study, the teacher and the primary interventionist used instructional explanations to clarify misunderstandings in the knowledge base of the learners. This is essential as the learners draw from their knowledge base when comprehending text. According to Renkl (2002) explanations restructure the learners' knowledge, resulting in improved problem-solving abilities. The need for instructional explanation in later school years is said to decrease, as the fundamental knowledge is assumed to be in place, and additional teaching methods are introduced.

As the learners develop, they may need a strategy such as scaffolding or guided participation (Rogoff, 1990), in addition to instructional explanation so that their learning can be supported. Furthermore, they can regulate their learning, draw inferences and integrate new learning with prior knowledge, all of which builds on their knowledge. Instructional explanations therefore need to be used in combination with other teaching strategies so that superficial processing is avoided (Wittwer & Renkl, 2008). Instructional discourse thus involves active participation, and
is more formal than conversational discourse. Merritt et al. (1998), and Naremore et al. (1995) assert that meaning is also coded linguistically without paralinguistic clues, and that the learner is frequently required to interpret information based on decontextualised experiences and unshared assumptions. This is expected of school-aged learners where classroom learning requires decontextualised use of language (Owens, 2005).

Different contexts influence the level of demand of the discourse, which may result in either immediate reciprocal or nonreciprocal exchange. Therefore, the type of method be it oral or written has an impact on the processing of instructional explanations. Verbal explanations have been shown to better monitor learners’ cognitive processing, as they are reciprocal, and any breakdown in understanding can be easily identified and clarified since learners contribute to the lesson. Naremore et al. (1995) argue that the teacher and the learner therefore need to actively participate in classroom exchanges, so that the meaning of the lesson can be unlocked through verbal discussions. This supports the belief that active participation of the learners, according to the constructivists’ model, benefits the learning process (Kumar, 2006). Naremore et al. (1995) also indicate that learners may receive instructional explanations from text, which may not be immediately reciprocal, and this may result in learners often misunderstanding the explanations. This is especially so in the case of reading expository text. This text genre forms a significant part of the intermediate phase curriculum, and is the education phase of the learners in this study. Learners mostly have difficulty with nonreciprocal exchange, as they do not get immediate feedback which allows for clarification of thinking (Naremore et al., 1995). This may explain to a certain extent the low levels of comprehension experienced by some learners in the intermediate phase where they engage with unfamiliar text, difficult text structure and the added complication of nonreciprocal exchange (Gajria et al., 2007). Learners may use re-reading strategies to assist with their comprehension. Wittwer and Renkl (2008) argue that although re-reading text may supply information, it may not build on learner’s knowledge as much as verbal explanations of the concepts do. Active verbal discussion seems to be the avenue that promotes effective comprehension of the information provided in instruction. Furthermore, it allows learners to clarify their thinking, which is part of metacognition. Resh and Kramarski (2007), point out that verbal discussions are not always evident in classrooms as teachers may be traditional rather than collaborative in their approach.
Teachers, internationally and nationally, agree that the aim of instruction is to promote learning among all learners, including those who learn easily, as well as those who experience difficulties (Naglieri & Johnson, 2000). This has been echoed by the South African Department of Education (DoE) since 1994. Although learning has a much wider meaning than just academic success, within the school context academic success is the focus. A major goal in education is to assist learners to develop the intellectual tools and the learning strategies that will enable them to acquire knowledge in different academic domains (Hay, 2000; Tzuriel & Shamir, 2007). This focus is clearly evident in the revised national curriculum for literacy in South Africa (DoE: RNCS, 2002). Since 1994 the DoE has aimed to enhance literacy skills as a result of the poor performance of learners indicated by education statistics (see chapter 2). The curriculum, according to the DoE (2002), emphasises the fundamentals of social learning theory and cognitive education. The theory stipulates that through a process of collaboration between the teacher and the learner, and among learners themselves, knowledge should be constructed where the teacher assumes a facilitatory role. The concept of a facilitatory role can be misunderstood as not teaching, and this was evident in the responses at the OBE open forum debate (2008), where some teachers stated that they were instructed by education advisors to not teach but to facilitate, confirming the misunderstanding of the term. In addition, the school should strive to develop life-long learners who can problem-solve effectively in all situations and who can apply the reflective functions of planning, monitoring and evaluating (DoE, 2002). This, however, is not evident in many schools, and the implied message is that successful learners are those who provide the right answer according to the teacher’s expectation, and when ineffective learning is evident, focus is on the learner and not the teacher (Grösser, 2007).

For instruction to be relevant, resulting in effective transfer, its design and the factors which influence transfer need to be considered as these impact on the outcomes and establish whether learning has occurred. Instruction format therefore has a major influence in learning and must be examined in terms of its design so that learning is maximised. The present study thus took these aspects into consideration and an intervention was structured to promote active participation by the learners in constructing their knowledge. Moreover, instructional explanation was utilised as it is essential for deeper understanding, i.e. transfer of knowledge. This is discussed in more
detail in chapter 5. For teaching and learning to be effective, several factors need to be considered such as diversity among learners, attitudes, training of teachers, classroom context, as well as the design and type of instructional discourse.

4.7 Designing Instruction

Merritt et al. (1998) agree that for instruction to be effective in learning, it must take into consideration the existing skills of the learners such as prior knowledge and cognitive abilities. This also links to the aptitude treatment interactions (ATI), where the instruction speaks to the learner’s specific needs as mentioned in studies by Haddad et al. (2003), among others. These studies have shown that instructional explanations in general do not necessarily foster learning but are likely to improve understanding when ATI is considered. It is important that the instructional explanations are therefore adapted to meet the needs of the learners so that effective understanding is achieved as well as deeper processing, supporting learners in using higher levels of text (Erickson, 2007). Instruction should also reflect the pragmatic abilities of the teacher, who should be able to detect when communication breakdowns occur, and provide the relevant repairs or adaptations when necessary (Norris, 1998). It was thus essential that the instruction in the intervention and the qualitative measures in the present study engaged the learners in such a way that they had an opportunity to verbalise their explanations, thereby reflecting their cognitive processes.

Instructional explanation therefore needs to take into account learner needs, as well as provide enough challenge to ensure optimal opportunities for learning. Kyriacou (1995) indicates that the “essence of effective teaching lies in the ability of the teacher in setting up the activity that brings out the desired educational outcome” (p.33). Furthermore, Wittwer and Renkl (2008) state, “If an instructional explanation is too easy for an individual learner, redundant information can absorb cognitive resources that otherwise would be devoted to the processing of more elaborate information and thus to meaningful activities that directly foster learning” (p.53). This, however, is not always the case with a class of diverse learners, as each learner’s needs may be different. Nevertheless, the instruction provided with intention and reciprocity on the part of the
teacher or the primary interventionist should engage the learner’s cognitive abilities. Metacognitive instruction is thus hypothesised to create awareness among learners regarding appropriate use of their cognitive resources. Several issues regarding instructional design must be considered to make the instruction effective. These include focusing on concepts and principles in the instruction, integrating the instruction in cognitive activities, applying instructional explanation in conjunction with learners’ knowledge construction activities, as well as examining transfer of learning and the length of exposure to new learning.

4.7.1 Focus on concepts and principles in instruction:
For learners to gain knowledge in any domain, they would need to have a good grasp of concepts and principles underlying that learning. This understanding is necessary for recall when solving problems. As a result of examining the literature, Wittwer and Renkl (2008) have come to the conclusion that there is a difference between the novice learner and the learner with more expertise. The novice learner refers to an individual who has recently been introduced to new knowledge, and has not had sufficient time and practice to consolidate it for effective transfer. In contrast, the individual with more defined conceptual schemas has had more practice with the information and can use it in problem-solving, and would be referred to as an expert or master (Halpern, 1987; Kyriacou, 1995; Shlomo, 2001). The expert learner has also developed complex interrelationships between schemas for easier transfer.

Schemas are acquired, and relevant units of information are stored and organised according to experience and content, making the information accessible for transfer to new learning situations. The importance of accessibility of the schema cannot be underestimated, as it influences transfer which is discussed later in this section. According to Shlomo (2001), the schemas influence the information processing from the initial experience, and the expectations the individual attaches to the processing influence interpretation and understanding. As the schemas affect the storage of the content, which impacts on accessibility for transfer, instruction needs to be carefully constructed so that concepts and principles are consolidated. The schemas can anchor the information for application and generalisation to other learning situations. Interrelationships between new concepts and existing concepts are fundamental, making it easier for retention and recall. This will prevent learners from being labelled as “perpetual learners” (Wallach & Butler,
1994). In other words, learners will not learn fragmented pockets of knowledge which are applicable to isolated situations only. This was confirmed in a study by Perry (2000), where mathematics teachers in Japanese and Chinese schools presented lessons that were more generalisable across problems and everyday life situations as opposed to the more restrictive teaching methods used in the United States (US). The study found that, as a result of the more “generalised” approach in Asia, Asian children outperformed US children in mathematics. The bridging principle or generalisation, an essential MLE criterion proposed by Feuerstein, was therefore incorporated into the current study, so that learners in the experimental school could transfer the metacognitive concepts not only to reading comprehension but to other areas of learning as well. When providing instructional explanations it is essential to identify the relationships between concepts so that the principles are understood and a deeper understanding is achieved. A learner who only has a shallow understanding of concepts and principles would not be able to apply the learning across contexts.

4.7.2 Integration of instruction with ongoing cognitive activities:
Active processing on the part of the learner is fundamental in the learning process. Instruction void of any meaningful context will not result in deeper understanding. This study thus ensured that the metacognitive instruction was applied to classroom comprehension texts and not to random reading material. This was important so that the learners believed that what they were learning was firstly related to their performance in the classroom, and secondly to what they do in the real world. Instruction that has inner value for the learner would be stored appropriately in their schemas for effective recall (Greenberg, 2000a, 2005a). Additionally, the verbal engagement of the learner with the teacher or the primary interventionist in the current study made the metacognitive explanations more realistic and meaningful as learner experiences added value to the learning.

Application of the instruction in cognitive activities shortly after the explanation, as well as self-explanation on the part of the learner, assisted in consolidating their understanding, making it easier to transfer to new situations. Ayres and Sweller (2005) show that when material involves multiple modes, for example, text and graphic information in the same task, less information is consolidated because learners have to split their attention and resources in order to process the
information. As a result there is an unproductive cognitive load for the learner, where resources are not used effectively as the relationships between the concepts and skill may not be evident. Active engagement with the instruction is thus necessary so that learners understand the requirements and make connections with prior knowledge, leading to a deeper understanding. According to Wittwer and Renkl (2008), the amount of adaptation of the instruction to the learners’ need, influences the level of their engagement in meaningful learning activities.

4.7.3 Instructional explanation in conjunction with learners’ knowledge construction activities:

As mentioned earlier, when new concepts are introduced, instructional explanations are indicated as a rule, rather than as an exception, because the aim is to construct the basic building blocks for knowledge (Perry, 2000). However, prior knowledge of the learners should be recognised and instruction has to be adapted accordingly. Instructional explanations in the absence of active processing activities will decrease cognitive engagement because some learners may believe that the explanations are sufficient and hence not participate actively (Wittwer & Renkl, 2008). Also, learners who assume that they have an understanding of the concepts may see the explanation as redundant, and may not pay selective attention or participate actively for a deeper understanding. Instruction therefore needs to be integrated with ongoing cognitive activities, so that information for the advanced learner is not seen as redundant or to avoid the so-called “expertise reversal effect” (Wittwer & Renkl, 2008, p.57).

Furthermore, providing only explanations would encourage a passive approach to learning. Therefore, allowing the learners to construct their own understanding of the concepts introduced would actively engage the learner, as the learner would consult his or her knowledge base and, through interaction, modify their understanding, making what is implicit explicit. This study thus encouraged learner discussion in the metacognitive instruction, so that they could discover the CEA metacognitive strategies, thereby helping them attach meaning to the new information. When defining the metacognitive concepts and personalising their application, it was assumed that the learners would take ownership of their learning. Renkl (2002) stated that studies on human memory have indicated that self-generated information is better retained than information presented by others. This was referred to as the “generation effect” (Wittwer & Renkl, 2008,
When learners generate their own understanding, it is more likely for generalisation to be more effective and evident.

When teachers and learners engage in learning, it involves more than the process of asking questions and elicit ing answers. Creating meaning entails a sustained interaction where simultaneous and sequential processing of information leads to understanding and predicting outcomes. This productive instructional framework is not always easy to accomplish, as the process requires effort to engage learners in active interaction, and that learners be given strategies and opportunities to have oral discussion to make their learning explicit (Isman & Tzuriel, 2008). Instructional discourse has specific benefits and, when applied effectively, can influence consolidation of content and conceptual knowledge. It also addresses the needs of learners, especially learners with language learning disorders (LLD), stimulating thinking, and scaffolding learners to higher levels of understanding. The learners who display good comprehension skills seem to make better links between new and previous knowledge.

According to Merritt et al. (1998), instructional discourse is a powerful mechanism to facilitate connections between background knowledge and the topic of discussion, allowing the learner to create meaning, resulting in improved comprehension skills. Effective instructional discourse also permits learners to reflect on their thinking by evaluating their understanding of the information, formulating hypotheses, integrating other knowledge bases, making comparisons and drawing conclusions. The teacher can in this process, construct scaffolds for learners, allowing them access to higher levels of text which they would not cope with if the instructional discourse was omitted.

Learners with specific needs can organise information, make inferences and improve comprehension within the supportive and facilitative environment that instructional discourse promotes (Merritt et al., 1998). These findings confirm the need for productive instructional discourse in any classroom. It can be assumed that many teachers, despite knowing what should be done, do not manage this framework effectively for several reasons. According to Staples (2007), the absence of this instructional framework in classrooms may be linked to an underdeveloped understanding of the role of teachers, and how they should organise and participate in this process. In addition to examining the levels of comprehension, learners have
different needs, abilities and preferences with regard to how they learn and construct their knowledge, consolidating the belief of the learner-focus model (Brady, 2006). Moreover, productive instructional discourse involves more than cooperative learning, with a greater degree of learner pro-activeness and interaction. This was illustrated in a case study by Staples (2007) where a successful collaborative inquiry was set up in the United States of America (USA) in a low attaining 9th grade maths class with an accomplished maths teacher. This case study was based on the premise that given the opportunity, students will reason and construct their understanding as part of a community of learners in a classroom. Two conceptual models were presented to a class, one focused on the teacher and the other model on the class. This teacher had specific instructional strategies which were used to organise a collaborative environment, while the other model, examined the class’ capacity to participate in collaborative inquiry practices, which developed over time. The success of the collaborative inquiry practice reinforces the notion that reforming instruction leads to improved outcomes in a collaborative context (Staples, 2007).

Further evidence for productive instructional discourse is provided by Hmelo-Silver and Barrows (2008), where facilitation of collaborative knowledge-building among medical students was shown to be effective. The participants in this study worked to progressively improve their ideas through engaging in knowledge-building discourse. The educator acted as a facilitator and supported learners through metacognitive questions, which advanced group progress. Even though the results of these studies may not be generalised because of their limited sample size and contextual location, their contribution to instructions in education is important to consider. Despite the successes indicated in these studies, some teachers continue to apply traditional instruction both internationally and locally. Knowledge-building may not be an easy process because a paradigm shift is required in the roles of teachers and learners towards a more interactive, inquiring and collaborative classroom exchange rather than the mere application of a programme (Staples, 2007; van der Walt & Maree, 2007).

Instructional explanations in conjunction with active cognitive participation of the learners will thus lead to greater understanding of concepts and hence knowledge acquisition. Further, the limited capacity of the working memory of the learner will not be unduly taxed as the instruction
will link to prior learning or knowledge, making learning relevant and meaningful for easier transfer. The concept of transfer of learning is discussed next as learning is reportedly achieved when application is maintained and transfer is evident.

4.7.4 Transfer of learning
When instruction is relevant, it is expected that learning will transfer to other contexts. The concepts of transfer, application, transference and generalisability are often used interchangeably in the learning literature. However, Shlomo (2001) indicates that transfer differs from the other concepts as it is a continuous process constituting several aspects including memory storage and transfer space. Transfer is defined as the ability to make use of previous learning in new and novel tasks (Kyriacou, 1995). Shlomo (2001) defines transfer as applying learning to another situation different from the one in which the learning was initially acquired.

Facilitating transfer is an important part of effective instruction and needs to be considered in its design. Transfer of learning relates to information processing, beginning with the receptive (input) stage, and moving through the stages of processing (elaboration) and storage, and recall (output) (Feuerstein et al., 1980). The information once received is actively processed in working memory and as mentioned earlier, there is a limited capacity at this level, therefore the relevance of the information and the strategies used to remember the information influence storage in the long-term memory or knowledge base. Retrieval of the information depends on the strength of the initial storage and the existence of interrelationships between the information (Kyriacou, 1995). Transfer can also be understood in terms of the schema acquisition that individuals establish when learning new concepts, and this is an ongoing process. Transfer of learning has been said to be easier with tasks which have similar cognitive content (proximal transfer) than with tasks that may have different cognitive content (distal transfer) (Shlomo, 2001). School subjects can be described as requiring distal transfer. Shlomo (2001) also indicates that when learners apply skills learnt immediately after the learning, this refers to the skill of application and generalisation, and is associated with the memory files acquired. Transfer, however, only occurs at a later stage, when the learner has to retrieve principles from different schemas to solve a problem. For transfer to take place, time and practice are needed.
4.7.5 Length of exposure to new learning:
The importance of time or length of exposure to new learning for effective consolidation, maintenance and transfer needs to be considered in instruction. It is argued that for consolidation to be effective, sufficient rehearsal and practice which establishes further links in the information are necessary. With regard to application, generalisation and eventually transfer of information, Feuerstein et al. (1980) introduced the concept of transcendence. Greenberg (2000a) uses the term “bridging” in this regard, which occurs when the mediator assists the learners in making the link between their learning and real-life situations. The teacher therefore needs to provide the opportunity for practicing the transfer experience, and not assume that transfer happens automatically. Moreover, this practice and length of time has associations with the concept of novice and mastery of learning, introduced earlier. The novice learner exposed to the learning will not be as effective as the learner who has developed mastery. The novice learner will therefore need a sufficient period of time and practice to consolidate the new skills before transfer can be effected. Barriers to transfer of learning are discussed next and will provide an understanding of why some learner outcomes may be different to their teacher’s expectations.

4.8 Factors influencing transfer of instruction

Factors that influence transfer may be related to one or many of the following: quality of the instruction, the learner and the teacher variables, as well as the learning context. These factors, according to Das (2001), are interrelated with learning.

4.8.1 Quality of instruction:
Feuerstein describes three out of twelve, as key criteria of the MLE, influencing the quality of the mediation process. This has been discussed under MLE in chapter 3. These key criteria include intentionality and reciprocity, meaning and transcendence. The teacher needs to have an intention which frames the learning for the learner, whilst maintaining rapport and engaging the learners’ interest. Secondly, the meaning of the new information needs to be unlocked so that an understanding is reached. Teaching strategies to unlock the meaning can include explanations, definitions and analogies, and have been presented in earlier sections. Erickson (2007) believes
that these strategies should focus on concept development, together with factual instruction, and will result in a deeper understanding, hence improved retention, retrieval and application. The third MLE criterion Feuerstein mentions is transcendence, which links the new learning to life situations. If these particular criteria are met in the instruction, quality, according to Feuerstein et al. (1980), is ensured. The quality of the instruction implies its design, that is linking the instruction to the needs of the learner is achieved, focusing on concepts and principles, linking new concepts to prior knowledge of the learner and integrating them with the learners’ ongoing cognitive activities and ensuring that active construction of knowledge is maintained (Wittwer & Renkl, 2008). If these concepts and principles are not adhered to, storage and transfer of instruction will be compromised, resulting in a breakdown in comprehension and ineffective learning.

4.8.2 Difficulties on the part of the Learner:
Even when the quality of the instruction is maintained, some learners may still not show any benefits. This may be due to many reasons, one being the subject matter itself. Learners may be overwhelmed with information. Cottrell (2001) describes large amounts of information as “coverage”, and he states that “coverage does not ensure understanding and learning” (p.4). The learners also require opportunities to engage in cognitive activities so that instruction received is applied and reflected on. A more reflective approach is thus suggested for effective learning. The learners need to understand the product (content) being learnt, the process involved, as well as understanding themselves as learners. Sometimes learners focus on the superficial level of understanding material and they need to develop the concept of learning as a lifetime process which is not acquired in a single lesson. Greenberg (2005a) refers to this as “learning to learn” and “life-long learning” (p.19). Learners need to understand the process of being independent and interdependent in their learning styles, and the benefits of this awareness, according to Cottrell (2001), are not only for the individual but for the society and the economy as a whole.

Learners may not seem to transfer their learning, as they may be looking for similarity in tasks, and if the task attributes are not recognised, transfer may be less effective (Kyriacou, 1995). Furthermore, the learners may not understand the manner of how information is processed, where their attention is required to ensure that the initial storage is effective and necessary for
later retrieval. They need to be aware that their active participation in learning develops the type of links or associations made in the learning process. Moreover, some learners may display an inability to identify when a situation requires retrieval of learning, or when the usual strategies are not relevant and the need to access other schemas to solve the problem is necessary. These cognitive factors have a major influence on learner performance and must be considered in understanding outcomes. Therefore metacognitive strategies are hypothesised to assist learners in identifying problems in their learning, making them more aware of their cognition, through reflective practice.

Kyriacou (1995) reiterates that over and above cognitive and academic variables, learner outcomes are impacted on by affective factors. Cottrell (2001) refers to this as non-cognitive variables including motivation, affect, interest and attitude. Learners’ personal qualities impact on their learning such as commitment, awareness of what is required, perseverance and the ability to manage set-backs. Learners who exhibit problems of transfer may not have understood the link of a strategy or skill with life situations or learnt cross-application. Absence of transfer will keep them rooted in “perpetual learning” (Wallach & Butler, 1994) The learners who don’t access their knowledge base effectively, as well as those with a limited knowledge base underuse or undervalue pre-existing skills and knowledge, making fewer links, and therefore permitting less access (Cottrell, 2001).

Moreover, the learners need to identify what beliefs have shaped their thinking and make adjustments so that the narrative they use in self-talk or "talk alouds" will promote rather than inhibit learning. The learners who are resistant to disequilibrium, which refers to a state that is not certain of the outcome, avoid challenges and internal questioning, and hence they don’t make the shifts required for acquiring higher levels of cognition and processing (Kyriacou, 1995). This may be because some learners may not be comfortable with the self-questioning process as it may challenge their worldviews on certain concepts. Diversity among learners in terms of their linguistics, culture, world knowledge, abilities, skills, learning styles, attitudes and motivation in the classroom is inevitable in classrooms across the world, and is especially evident in South African schools since the abolition of apartheid (South African School’s Act 84, 1996).
Some learners display poor motivation, as they opt out of active participation in lessons in order to preserve their dignity and guard their emotions, afraid of exposing their understanding or misunderstandings. Linked to a poor self-concept is an awareness of the influence teacher expectations have on learners’ attitude towards school learning. The self-fulfilling prophecy refers to “the idea that teachers’ expectations regarding pupils’ educational progress are communicated to the learners and this has a marked influence on their subsequent attainment” (Kyriacou, 1995, p.53). Expectations involve a two-way process between the teacher and the learner, with each individual influencing the other. Furthermore, anxiety, which is an important source for motivation can be overwhelming, thus affecting the learner’s performance negatively. Learners need a manageable level of anxiety to perform at their peak. However, some learners focus excessively on their anxiety, affecting their cognitive processing. Greenberg (2005a) indicates that a supportive environment and a mediator will assist such learners in dealing with these feelings of challenge so that learning potential will not be compromised.

4.8.3 Instructor/teacher:
To ensure effective instruction and learning, teachers must have a good knowledge about themselves as facilitators in the learning process, the learning styles of their learners, the content of their curriculum, and the assessment measures that are needed to evaluate the process and content of that grade (Grösser, 2007; Rock, Gregg, Ellis & Gable, 2008). Extensive research on teachers, their attitudes, aptitudes, pedagogical beliefs and style of teaching has been carried out (Resh & Kramarski, 2007). These studies provide an insight so that teachers are better understood in the process. Pedagogical instruction of teachers is theoretically based on “good teaching methods and practice” (Greenberg, 2005a, p.44-45). Historically, knowledge bases of teacher education have focused on the content knowledge of the teacher (Veal & MaKinster, 2008), but recent shifts, however, have focused on pedagogy at the expense of content knowledge. Shulman (1986) developed a theoretical framework of pedagogical content knowledge, which combines content and pedagogy knowledge bases. Shulman argues that a combination of these two knowledge bases is essential to prepare teachers more effectively. Pedagogical content and knowledge of learners’ cognition form a dynamic and supportive network. Resh and Kramarski (2007) postulate that within this network all types of knowledge
interact with one another and produce transformations from one form to another around a central task of effective instruction, ultimately enhancing learning.

Despite the progressive attitudes expressed by teachers, many continue to teach using conventional methods. This was confirmed in the study by Resh and Kramarski (2007), which examined teachers' beliefs and pedagogical practices in 165 Israeli public schools. Their study applied a survey design and was carried out on a random sample of Grade-10 teachers. The results indicated that even though the teachers expressed relatively progressive attitudes, their teaching practices were conventional. These results were explained as being due to entrenched behaviours or a result of a lack of training and professional developments, as well as systemic conditions such as large classes, limited resources, demands to cover the syllabus and prepare learners for tests. These findings were supported by the study of van der Walt and Maree (2007) who also indicated that teachers in South African schools rarely, if ever, demonstrate to learners what "learning how to learn, problem solving or thinking about one's thinking" (p.224) means, even though the teachers are aware of the learning areas and strategies to teach. This confirms the notion that the criteria set by outcomes based education (OBE) or the revised national curriculum in developing life-long learners are not always achieved, hence the need to revisit this system. Developing thinking learners seem to be easier in theory than in practice. The importance of the teacher’s role in instruction cannot be underestimated as they are the agents that support change in the learner. Vygotsky (1934/1987) argues that developing higher order thinking and processing is not automatic and requires a more knowledgeable other to structure the instruction, and mediate the learning from one level to the next. Teachers need to make explicit the instruction and link the strategies for learning with the relevant content. This association builds on the knowledge base that the learner accesses when processing information.

Furthermore, teachers need to provide feedback to learners so that "they are aware of their performance in learning, and this has implications of how learners can form their future expectations and aspirations about learning" (Kyriacou, 1995, p.50). Feedback to learners relates to cognitive outcomes and is frequently mentioned in education pedagogy. Hatti (1992) adds that teacher feedback is the single most powerful modification that enhances learner achievement, and must be provided timeously. Moreover, feedback facilitates learning, consolidates input,
reinforces and motivates learning. Marzano, Pickering and Pollock (2001) argue that feedback needs to be specific so that learners can benefit from it, in other words they need to be shown how to improve and alternative approaches should be discussed with them if a certain approach no longer applies. Instructors or teachers need to demonstrate thinking and learning to learners. Cottrell (2001) indicates that too often learning breaks down when students are told to do better but not shown how to do so. This validates the findings of the study of Van der Walt and Maree (2007) who found that even though teachers are aware of their metacognition they do not demonstrate to learners how to think about their thinking. Teachers need to model and reinforce the skills they would like their students to acquire, and not just mention these strategies (Borkowski, 1992).

Despite the researched and reported benefits of the South African curriculum, as well as the reported attitudes and beliefs of teachers, the classroom contexts do not sufficiently reflect the education model that is proposed by the DoE, since 1994. Persistence of traditional methods may be due to teachers not being adequately prepared, having large number of learners per class, diversity among learners as well as teachers not understanding sufficiently what instructional discourse is. This may result in them not internalising the process, focusing on vast amounts of content - the “what of learning” rather than the “how of learning” required by the curriculum (Staples, 2007). Haywood (1977) believes that when schools free themselves from content achievement anxiety and assist teachers in promoting their skills as mediators, effective learning will be evident. Continued application of traditional methods which focus on content may not have positive consequences in terms of generalisation to new learning, especially for the poor achievement learner. Hence, learners with low literacy levels may not be able to transfer learning to new material, perpetuating the low levels of literacy experienced in this country.

4.8.4 Context of Learning:
Strategies for learning have frequently been provided within a deficit model, where weak areas are identified and strategies are introduced to “fix” the problem. However, more recently the developmental model has been promoted where strategies can be introduced within the curriculum as part of its content so that the potential of all learners may be encouraged. Such an attempt is indicated in the current study, and the intervention was applied to all learners.
irrespective of their performance on the PASS constructs. This is important so that learners would see the relevance, and attach meaning to the strategies and skills introduced as part of their curriculum rather than in discreet modules. Furthermore, a link between learning and assessment tasks needs to be made so that learners see assessment as another context of learning which will promote transfer (Cottrell, 2001).

Conditions for learning need to be changed or adjusted for effective learning to be achieved, including altering certain aspects of the environment, wording of tasks, rephrasing instruction, selecting appropriate strategies, developing alternate strategies, altering attitude to tasks and demonstrating the process of learning. Explicit instruction of strategies and skills is also needed and has to be ongoing, as there are different expectations at different levels of learning and abstraction. It is important to create challenges and a state of disequilibrium in the learning so that learners manage it and work towards a shift in thinking. Additionally, it is essential to mediate this learning process so that deep understanding is developed, and a reconceptualisation of self and the process of learning is fostered (Cottrell, 2001).

Diversity in learners’ abilities is a reality in all classrooms, and this is assumed to be the case in the South African context. According to anecdotal reports, teaching diverse groups of learners is becoming increasingly challenging not only in special needs environments but in mainstream education as well (teachers, personal communication, 2010). Moreover, large numbers of learners of approximately 30 to 45 learners per teacher, in often traditional instructional contexts, have been reported. The learners’ success in traditional contexts is linked largely to teachers and teaching methods, where the teacher has been described as the agent who manages the learning and is accountable for improved educational outcomes (Rock et al., 2008). Metacognitive instruction in this study therefore promotes the learner, the teacher and the context as influencing variables in the process of learning.
4.9 Implications for Instructional Outcomes

Given the above information, it is clearly evident that a change in the type of instruction is essential in schools. Although metacognitive and cognitive instruction is indicated in the revised curriculum in South Africa, it is not put into practice for several reasons and thus has resulted in the current difficulties experienced by the education system. In addition, it can be argued that the revised national curriculum proposed by the South African education department does embrace a more collaborative or progressive model of instruction and this is indicated in the introduction of OBE principles, where classroom exchanges in South African schools are assumed to have evolved, and more group-work or social learning and collaborative contexts are being encouraged. This progressive educational shift, in contrast to traditional methods, centers around the acquisition of experience, emphasizing all-round development and self-discipline of students, and the role of the teacher as a facilitator (Brady, 2006). Albeit, this view of progressive education has advanced over time, the significance of the participation of the learner, the teacher and the social context needs to be continually highlighted, as it has not being consistently applied in South African schools as anticipated (Van der Walt & Maree, 2007).

Collaborative exchanges between the teacher and the learners are essential for learning and literacy success. This notion needs to be repeatedly emphasised until consistent application both in international and local South African schools is evident. Resistance to change is a natural human phenomenon but with guided support change can be introduced gradually. The paradigm shift recommended in the revised national curriculum of South Africa links up with the collaborative environment presented, as well as with Vygotsky’s theory of knowledge construction. The shift, however, still represents the content of instructional discourse, and teachers may not engage spontaneously with a collaborative framework as they may neither have experienced the process nor had sufficient training. Feuerstein’s set of criteria for MLE, as introduced in chapter 3, will assist teachers in expressing the belief that structural cognitive modifiability (SCM) is possible as indicated in the literature (Feuerstein et al., 1980). Furthermore, Vygotsky’s reference to dialogue, where learning develops from verbal interaction and verbal support of the learning context, is also alluded to in the South African national curriculum. It is within this framework that metacognitive instruction can be easily accessed, and
is promoted in the present study. Metacognitive instruction, as introduced in this and the next chapter, refers to the encouragement of skills in planning, evaluating and reflecting on the learner’s thinking when engaged in an activity.

Consideration of the instructional discourse regarding reading comprehension in particular is important as it is hypothesised to have a significant impact on learning. Kim et al. (2006) corroborate that metacognitive awareness and strategies are required for successful reading comprehension. This is essential as current classroom instructional discourse is not always conducive to optimising comprehension of text. Massey (2003), and Eilers and Pinkley (2006) postulate that classroom time is spent on the content of the comprehension passage rather than on mediating the process of strategy application that the learner can use to complete the task. This prompted a study by Massey (2003) in which a comprehension checklist for elementary grades was formulated. The learners had individualised lists, indicating the strategies they selected, which they could use independently. This technique of compiling a list of their own strategies for reading involved metacognition, as it made the learners aware of their own reading process. Massey’s study indicated that active participation in learning made the learners aware of their thinking. This supports the argument that classroom instruction based on the criteria of Feuerstein’s MLE approach and Vygotsky’s theory of active participation in the construction of meaning is needed. Cognitive education recognises active participation in construction of meaning and forms the foundation of the recommended South African national curriculum, and is proposed by and investigated in the current study.

Strategy-based models advocated in cognitive education approaches allow learners opportunities to develop independent skills by encouraging them to reflect on their thinking. The benefits of cognitive education have been confirmed in studies internationally (Haddad et al., 2003; Naglieri & Johnson, 2000). Metacognitive skills assist learners to benefit from instruction and it is therefore important to include reflection, evaluation and monitoring in the curriculum. Cognitive and metacognitive education allows the focus to shift from just content to a combination of content and process. According to Haywood (1977), the eradication of the content is not the solution but rather a balance of product (content) and process (mediation) needs to be achieved for effective learning to take place.
4.10 The South African Education System

As has been mentioned earlier, the quality of student learning is influenced by many factors such as home background, school culture, teaching quality, availability of resources, and also the individual learner. Taylor (1999), who writes extensively on South African educational issues, argues that the curriculum is key in any education system, as it provides direction for teaching and learning. From the discussions in chapter 2 on the status of education in South Africa, its history and curriculum selection, it can be said that the South African stakeholders in education, post-apartheid, have a vision of education for this country. The system selected is a progressive form of education, although several criticisms of the system have been noted and are considered, it must be continually evaluated in terms of whether its outcomes are being achieved.

In the current South African education system, schooling is said to equip learners to show independence and initiatives in directing their own learning. Learners should be able to ask questions, evaluate evidence, defend arguments and apply their knowledge to new situations (Bernstein, 1996). They should acquire higher-order thinking skills that go beyond recall, recognition and reproduction. Furthermore, the learners should be able to evaluate, analyse and synthesise information. These learning goals and expectations are cognitive in nature. In addition to this progressive approach, South Africa also embraced a political view to the curriculum. The DoE (1997) indicated that this was necessary as the political view would redress the values of common citizenship and nation-building, which was absent in the apartheid education system. The South African education system can thus be seen as having a combination of progressive and radical competence models of curriculum in which political, social and economical agendas operate (Chisholm, 2005; Kraak, 1999).

**Challenges relating to the C2005 and the OBE framework:**

At face value, this curriculum system seems to embody an ideal vision for a country which previously did not have a holistic and integrated view of education for its people. Nevertheless, implementation of C2005 and the OBE framework are not going to succeed as expected if the challenges of curriculum, teacher development and learning materials, which form the three pillars of the OBE structure, are not aligned with each other (Potenza & Monyokolo, 1999).
Difficulties in the OBE system have been acknowledged by the current Minister of Education, Motshekga (2010) and revisions are being developed for the 2014-2025 education plan. Outcome-Based education and C2005 are discussed, as they were in operation at the time of this study. The curriculum framework and C2005 specifically set the agenda for teaching and learning in South Africa, post-apartheid (Taylor, 1999). The learning areas identified have their own learning programmes, specific outcomes and assessment criteria. According to Taylor (1999), many of the learning areas in OBE were superficially structured, relating to personal knowledge and did not develop conceptual depth, which was then left to the teacher to develop. This again assumes that all teachers have sufficient knowledge of the concepts being taught.

Unlike the performance model, which focused on what was taught, assessed and achieved at school, with little value placed on personal experience, the competence model (post-apartheid) placed greater emphasis on everyday knowledge so that individuals would value their identity and that of others (Taylor, 1999). While this is good for nation-building, and individual and ethnic recognition of cultures and beliefs, it did not recognise the disparity some learners from rural areas experienced when compared to those living in urban areas. According to Taylor (1999) and Fleisch (2008), working-class children in rural areas have a different experience when it comes to accessing formal school knowledge, as a result of poverty, poor accessibility to schools and limited or absent resources. This disparity is important to acknowledge as formal school knowledge and everyday knowledge both play an important role in education pedagogy, which together, introduce learners into formal discourse and promote their understanding for effective application to the real world (Taylor, 1999, p.120).

According to Taylor (1999) the greatest obstacle to equity in any schooling system is the differential access to formal knowledge open to children of different social classes. Therefore, the assumptions made by the OBE framework would not be fair with regard to learners from the less advantaged classes. In addition, supporters of the progressive approach assumed that all the learners in South Africa were operating at the same level. Fleisch (2008) indicated that education in South Africa needs to be considered as a bimodal system as the learners from less resourced facilities in the rural areas may have different access to formal knowledge provided by schooling compared to children in urban areas. Furthermore, children from middle-class backgrounds are
able to enter school with a certain amount of existing knowledge that allows them easier access to formal school knowledge (Taylor, 1999). This, together with their personal experiences, permits them to access learning from a more advantageous level. In addition, Taylor (1999) maintains that the success of middle-class children in schools has a knock-on effect on access to higher education and opportunities for jobs and further education.

Furthermore, teachers, in a study by Jansen (1999b) which examined the implementation of OBE in Grade-one classes, indicated that they felt that OBE assumed all learners were at the same starting point and that all prerequisite skills were established. Looking at the above argument it can be seen that this assumption can have grave implications for successful learner outcomes. Jansen (1999b) maintained that despite the OBE framework being learner-centred, it was found that it was implemented through traditional methods, in other words it was teacher focused with teachers talking 90% of the time. Teachers also expressed their dissatisfaction with poor or insufficient training. Several myths including the teacher’s role as a facilitator, as well as teaching the three Rs in the foundational grades, existed. This may be due to lack of effective teacher training which had a negative impact on the education system (Jansen, 1999a).

According to Potenza and Monyokolo (1999), the teachers commenced training, while the OBE policy was in its draft stages. They added: “The process of turning national outcomes statements into everyday classroom practice is challenging, even for schools with capacity and resources” (p.235). As teachers are key in the mediation process, and a valued resource, support and further training is therefore fundamental for success. However, it appears that this point may not have been prioritised in the OBE approach. Muller (2000) indicated that if teacher training is not prioritised, existing inequalities in the provinces will be perpetuated and the outcomes of OBE will not materialise as expected. The content, if not built into the structure of OBE, will proved to be challenging for many teachers, who were expected to be resourceful, creative and formulate their own teaching material. This approach presupposed that all teachers are at the same level, which is not the case given the past inequalities in South Africa. These statements of dissatisfaction expressed by researchers and teachers are some of the reasons behind the current plan in education of changing from the OBE system to a revised model: action plan 2014: towards the realisation of schooling 2025, to be finalised (Motshekga, 2010).
Even though the OBE model has several criticisms, as indicated in several reports, many of the criticisms were not based on the OBE principles but rather on its design and implementation, as well as its relevance for the South African learner given the country’s history. The challenges faced by teachers in the implementing OBE seem to have encouraged them to be more reflective on the implementation of the new curriculum, which may incorporate some proposed changes as expressed by the current Minister of Education, Angie Motshekga, in 2010. These issues have motivated this study in that the metacognitive instruction proposed, promotes explicit instruction which embraces many of Vygotsky’s and Feuerstein’s theories of learning, and also includes many of the underlying principles found in the OBE framework. Cognitive education as defined and described in the international and local literature is presented in the next chapter in order to provide a framework for the metacognitive intervention selected for the present study. The following chapter also focuses on the researched and applied theory that justifies the essential nature of the methods that promote effective learning.

4.11 Summary of Instruction and Learning

Instruction and learning have a significant impact on learner performance in the educational context. The concepts of instruction and learning are complimentary and not separate entities (Grösser, 2007). The teacher and the learner are active participants in the classroom discourse which aims at enhancing knowledge, developing skills and achieving academic success. The quality of the instruction is nevertheless paramount as it reflects the presence or absence of mediation as described by Feuerstein et al. (1980). Methods of instruction have been described as traditional or progressive in the education literature. The present study supports the progressive view of instruction, which is more learner-centred, encouraging active involvement of learners in the process of knowledge construction. However it also acknowledges the essential role of instruction. The academic curriculum often focuses on content with little emphasis on process, even though both are considered important for learning. Nevertheless, coverage of content in the main, according to Cottrell (2001), does not ensure learning. The design of the instruction should therefore be considered so that a balance between content and process is achieved resulting in the desired learning.
Furthermore, new concepts which are introduced need to be linked to existing schemas to ensure understanding and therefore effective learning. The successful transfer of learning depends on the initial processing and storage of information. Instructional explanations, definitions and analogy were incorporated into the metacognitive instruction in the present study so that comprehension and effective acquisition of schemas could occur for effective learning and transfer to take place. The metacognitive intervention employed in the current study is discussed in chapter 5. Effective instruction also implies that quality instruction needs to be integrated with relevant cognitive activities so that there could be meaningful opportunities for learning and practice (Wittwer & Renkl, 2008). Sufficient practice is necessary for consolidation and transfer, thereby developing the learner from levels of novice to mastery. There are several factors that may influence effective transfer of learning, including the quality of instruction, the teacher, the learner (cognitive, academic and affective issues) and the learning context. These have implications for instructional design and policy. This is especially relevant in the context of this study, as the South African education is in a current state of change. The challenges facing the new education dispensation include the curriculum and the OBE framework. Even though the instruction principles of OBE are sound, its design and implementation in relation to the teachers and learners in South Africa need to be re-examined.
"If someone knows something, then he knows that he knows it and at the same time, he knows that he knows that he knows".

Spinoza (1632-1677) cited in Weinert, 1987

5.1 Introduction

This chapter explores both international and local literature, examines the debates and the application of metacognitive strategies, as well as their effects on learning. Metacognitive engagement in the classroom reflects the type of instructional discourse teachers and learners use when constructing knowledge. Furthermore, it encourages learners to function in their ZPD, as well as to actively engage in thinking, as indicated in Spinoza’s quote above, when interacting in the learning process, making what is implicit knowledge explicit. This section therefore refers to metacognition, cognition and classroom instructional discourse mentioned in the previous chapters. In addition, the type of metacognitive instruction provided in this study is examined in terms of its theoretical background and its application to learning. Many studies that have applied metacognitive approaches locally and internationally are reviewed to lend support to the current study and create a discussion about approaches that promote effective learning. The term "metacognition" was introduced by Flavell in the 1970s in the context of developmental psychology. Its conceptualisation and development in education and psychology are examined further in this chapter with particular reference to this study.

5.2 Cognitive Education

Cognitive education has been promoted as a successful method of instruction in the classroom since the 1970s; however, it hasn’t yet become mandatory within education. Although there are many studies reported in the cognitive literature, a number of them seem to agree that the concept of metacognition is theoretical and needs to be evidence-based. Jacobs and Paris (1987) maintain that cognition and specifically metacognition is a global construct that has not been defined precisely nor measured frequently. There has been considerable debate about the multiple meanings of the concept, and it is argued that not until
a more precise definition is achieved will a clearer understanding and application of the approach emerge. Most of the studies reviewed in this chapter are international with only a few published studies occurring in South Africa. The populations indicated in these studies are generally learners who are at risk for academic failure as a result of various factors such as socio-economic status, learning difficulties and poor instructional methods.

The definition of metacognition, its instructional approach and application, as well as how it can be measured are considered so that a deeper understanding may be obtained. Flavell (1977) stated that cognition is an ambiguous term because it has multiple meanings. It is thus a concept that sparks debates because of its complex and unpredictable nature. By formulating a fixed definition one can easily lose sight of the enormous contribution cognitive instruction makes to learning and development. As discussed in chapter 3 on cognition and cognitive theories, cognition is a broad and inclusive concept, which includes cognitive functions such as memory and perception as well as social cognition since mental processes are involved in all human psychological functioning (Flavell et al., 1993). The interdependence between these psychological processes is essential for effective cognitive functioning. According to Flavell et al. (1993, p.3), “What you know affects and is affected by how you perceive, conceptualise and classify information, which influences how you infer, reason and ultimately think”. The human mind is generally described as a highly systematically organised entity with rich interconnections among its components.

Cognitive development requires cognitive instruction, which refers to the thinking strategies applied in learning and promoting growth, and is often used interchangeably in the literature with the term “metacognitive instruction” thereby causing lack of clarity. Nevertheless, Van der Walt and Maree (2007) state that even though each of these concepts has distinctive and important functions, both refer to effective teaching and learning. According to Flavell (1977), the distinction between these terms lies in how the information is used. Cognitive strategies are evoked to execute tasks and facilitate cognitive processing, whilst metacognitive strategies indicate reflection on thinking through monitoring, planning and evaluating the outcomes of the task the learners are engaged in. Thus, “metacognitive activity can precede or follow a cognitive activity” (Livingston, 1997, p.2). In addition, Flavell et al. (1993) maintain that metacognition is important for all types of cognitive activity, including listening comprehension, oral persuasion, reading comprehension, writing, social cognition,
perception and memory. Thus, it can be argued that metacognition and cognition are operative in all learning activities, endorsing their distinct functions.

Effective thinking, learning and teaching relate not only to the learner but to the teacher or any significant other in a particular learning context. The teacher in the classroom context is required to know the goal, plan the process, and carry out regular monitoring and evaluation of the outcomes (Grösser, 2007). This type of engagement between the learner and the teacher then reflects an active process of instruction and learning. It supports the paradigm shift from one where the teacher imparts knowledge to a passive learner, to one of active engagement between teacher and learner in the classroom. According to Conway and Hopton (2000), this broader concept of teaching and learning has been emerging ever since the 1980s, and this is fundamental to the curriculum proposed by the DoE in South Africa, since 1994. In addition to active participation in the learning context, the content (the what in learning) and the process (the how in learning) need to be take into account. For the purpose of the current study, the term “metacognitive instruction” is used to refer to the intervention, as reflection on thinking is the focal point, which is the essence of the intervention plan. Cognitive strategies may also be referred to, depending on the context.

**Definition of Metacognition:**

Despite the broad definition presented, metacognition refers to the ability to think about thinking or “cognition about cognition” (Flavell et al., 1993). Through metacognition the learners focus on strategic thinking about higher-order constructs, and metacognition provides teachers with an alternative avenue for instruction, focusing on the process rather than just the product (Jacobs & Paris, 1987). Early writers in the field of cognitive education and psychology described metacognition as a “fuzzy concept”, one that cannot be described precisely and accurately. This is understandable as thinking is a fluid and dynamic process. Therefore researchers have differed in their opinions of what characterises metacognition, hence the broad conceptualisation. According to Flavell (1977, 1987), metacognition includes knowledge, motivation and affect. He discusses metacognition in terms of metacognitive knowledge and metacognitive experience. With metacognitive knowledge, the individual acquires world knowledge and beliefs about cognitive matters through experiences, and this is stored in the long-term memory (knowledge base). This involves knowledge about person, task and strategy variables. The essence of metacognition is the combination of, or interaction with, these categories (Flavell, 1987). Individuals involved in a cognitive event will...
understand their personal attributes, know that different levels of tasks will make different demands on their processing resources, and will adjust accordingly so that appropriate resources are allocated. Furthermore, the individual will use cognitive strategies to achieve the goal and metacognitive strategies to monitor cognitive progress. It is important therefore for both the learner and the teacher to understand the demands of different cognitive tasks so that the appropriate strategies can be selected to achieve success.

The second aspect of the metacognitive concept, according to Flavell (1987), refers to the metacognitive experiences and self-regulation. This involves conscious experiences that are cognitive and affective. Monitoring and self-regulation develop parallel to metacognitive knowledge. The individual, when monitoring their thinking in an activity, can make better selection of strategies to promote success, and can create an awareness of new metacognitive knowledge which, without self-regulation, cannot be realised. Flavell maintains that, as individuals mature, experiences are better understood and are appropriately managed, while young children who have had these experiences are not always able to handle them effectively. Younger children may seem to not appreciate the meaning, significance and implications of such metacognitive experiences and therefore do not appear to deal effectively with them (Marsha & Camahalan, 2006). This aspect of reflection on the process in learning is essentially what metacognitive strategies promote, and these strategies are the focus of the intervention in the current study.

In addition to Flavell’s perspective, some early researchers understand the concept of metacognition as knowledge but not affect, others see it as conscious knowledge and deliberate action, or indicate it as tacit and automatic. Metacognition for Jacobs and Paris (1987) refers to "any knowledge about cognitive states or processes that can be shared between individuals" (p.258). The essential feature here is knowledge that can be demonstrated, communicated, examined and discussed for others to be aware of. Metacognition, as referred to earlier, exists if reflection is implied. Reflection then can be argued as the essence which distinguishes metacognition from cognition. There is thus still a lack of consensus among researchers on what constitutes metacognition. Many studies have indicated the positive effects of metacognition on learning but the strategic behavioural application or spontaneous transfer across learning contexts still needs to be researched (Haddad et al., 2003). This highlights the concepts of transfer and measurement in relation to metacognitive intervention, and these concepts are discussed in later sections in this chapter.
Furthermore, Jacobs and Paris (1987) examine metacognition in two categories, namely, self-appraisal and self-management. To make these categories more explicit, examples relating to the reading process is included. Self-appraisal can be subdivided into three categories, specifically, declarative, procedural and conditional knowledge. Declarative knowledge is what is known in a propositional manner. Here the reader who is introduced to a new topic will know that a topic is familiar because their prior knowledge will assist in comprehending the material. Procedural knowledge refers to the process of thinking, where the reader knows how to use the context to understand a word in the text. Conditional knowledge is an awareness of the conditions that may influence learning, and the individual needs to make the necessary adjustments for effective outcomes. In the reading example, the individual will move to a quieter location to avoid distractions while reading. An awareness of the cognitive process involved in the activity is fundamental to metacognition. Individuals can only reflect, monitor and evaluate their thinking if cognitive awareness is in place, and this links to the second category, self-management, described by Jacobs and Paris (1987).

In the executive process of self-management three processes are described (Jacobs & Paris, 1987). The first process, planning, is a selective coordination of cognitive means with a cognitive goal. Therefore, in the reading example the individual will strategise how they are going to work through this task, where they may want to reread a passage to gain a better understanding before answering the comprehension questions. The second process in self-management is evaluation. This happens when during the activity the individual stops and monitors their progress to achieve the goal. A reader will thus question and summarise, creating a mental image to assess their understanding of the text. Regulation, the third process, requires the individual to make adjustments and take control of thoughts and actions to achieve their goal in the reading activity. This understanding of metacognition facilitates how it can be measured and presented as an instruction, as well as identifies its impact on learning.

**Metacognition: Its influence on learning:**

An understanding of how reflection on thoughts impacts on the learning process is possible given the above definitions of metacognition. From the different perspectives presented by the researchers in this field, metacognition can be argued to be a complex construct, which underscores the fact that thinking is intricate and dynamic. Moreover, it supports Das’ (2001) view that the reader is an information processor (see chapter 3). According to Marsha and
Camahalan (2006), metacognition helps regulate the flow of information through working memory, and as indicated by the information processing theory, monitoring of this processing is critical due to the limited capacity of the working memory. This implies therefore that the metacognitive strategies, which are essential for the learners to cope with scholastic activities, must be explicit in their instruction so that better understanding of the process in learning is achieved. Furthermore, classroom instruction that does not engage the learner actively may impede the learners’ opportunities to develop concepts required for higher-level thought processing or to transfer learning to other situations. Culatta and Merritt (1998) indicate that through this active learner engagement, schemas are developed and meaning constructed, linking new knowledge with existing knowledge. In addition, the teacher, through the type of classroom instruction selected, can develop learners in their ZPD (Orechkina & Greenberg, 2007). Explicit instruction on metacognition is assumed to therefore promote reflection, monitoring and evaluation, resulting in learning and hence development.

It can be hypothesised that learners who do not engage effectively in metacognitive processing may not reason, deduce or problem-solve successfully for learning to be effective. As Flavell (1987) asserts, “the school provides numerous opportunities for learners to acquire and develop metacognitive knowledge about person, task and strategy variables, as well as monitor and regulate their metacognitive skills, developing them from novice to semi-expert in micro domains” (p.27). It is therefore an opportunity for education systems to maximise this position. Moreover, learners who display an inability to learn should be taught metacognitive strategies and self-regulating behaviours to assist them in their learning, confirming the belief of Feuerstein (1979) that learners have the potential to change. Traditional teaching methods, however, do not seem to encourage metacognitive strategy development and reflection, which inhibits learners with poor performance from accessing their cognitive skills. This is inferred from studies conducted locally where metacognition, even though it is implied in OBE, is not explicitly applied when teaching the curriculum (van der Walt & Maree, 2007).

From the above argument which is supported by Derry (1989), and Conway and Hopton (2000), it can be seen that metacognitive instruction has the potential for developing effective learners. As a result, cognitive education has, in recent years, been highly emphasised where skills and strategies as well as content are considered important aims in education. Cognitive education, based on educational, social and economic reasons, is indispensable in current
times, as independent and interdependent thinkers are required in this technological and information age (Greenberg, 2000a, 2005a; Matsagouras, 2001). Even though cognitive instruction has reportedly become more acceptable, especially for children at risk for academic failure, it should be made available to all learners (Haywood, 2001; Naglieri & Johnson, 2000). A study by Matsagouras (2001), reported that the development of “critical thinking” is recognised internationally, and that the Greek school system has prioritised and placed it at the top of their educational aims. According to Cèbe and Paour (2000), the French Education Ministry has now also acknowledged the importance of cognitive and metacognitive strategies for learning. Although many studies describing cognitive education are indicated internationally, only a few studies are evident in South Africa. At a recent cognitive summit in Johannesburg in June 2009, the role of cognitive education in South Africa was discussed, which indicates that South Africa is beginning to follow global trends.

5.3 The Effects of Cognitive Instruction on Education

As mentioned earlier, cognitive education has an impact on academics, socio-economic, emotional and psychological issues of the individual and of society. Its influence has far-reaching consequences for the individual’s potential, and thus their educational success. According to the various studies discussed in the cognitive literature, and presented later in this section, the effects of cognitive education can be identified, and they imply that creating an awareness of how an individual thinks when engaging in a task results in improved educational performance.

When examining and analysing any of the intervention studies, the measurement techniques used in the study’s design need to be explored so that the results reported can be validated. Measurement of metacognitive instruction and application of skills has also received scrutiny in the cognitive literature because of the methods used to collect data. The data are often collected from interviews which may not always be described precisely and accurately (Jacob & Paris, 1987). They also state that some studies which describe reflection of thought in interviews are not viable as researchers may infer what the individual has done, at the risk of assuming that the individual understands more than what they may actually have accomplished. Furthermore, the Hawthorn Effect may be present where the learners’ responses are influenced by the study’s aims and the researchers involved. Self-reporting also
presents challenges of subjectivity, with regard to timing of the interviews, recording, group
dynamics and tangential responses of the participants (Johnson & Onwuegbuzie, 2004). The
current study thus attempted to overcome the bias of any one approach, and applied a mixed
methods design, so that triangulation of data sources could provide a wider perspective of the
effects of the intervention on reading. A detailed explanation of the mixed methods approach
employed in this study, is presented in chapter 6. More important is that researchers need to
apply rigour in their measurement and analyses so that all outcomes and limitations are
published, thereby informing pedagogy.

Having mentioned the possible limitations and challenges of self-reporting in cognitive and
metacognitive measurement, the studies and their contributions towards understanding
metacognitive instruction in learning, specifically reading, can be examined, as they link to
the present study. Haywood (2001) mentions several studies which reflected cognitive
education within the school context. He has recently also indicated the growing interest in
applying cognitive education across other areas, including specific populations (children with
attention deficit hyperactivity disorder (ADHD), children with special needs and children
from diverse cultures). Other studies have examined learners from different socio-economic
status groups as well as individuals in psychotherapy (Cèbe and Paour, 2000; Cornfield,
2001). Some of the studies discussed below relate to broad areas of cognition which influence
learning, whereas other studies are more closely related to academic content. All the studies
discussed nevertheless indicate the positive impact mediation has had on learner outcomes.

Conway and Hopton (2000) conducted a study in two primary schools drawing from diverse
socio-economic groups in a selected area in Australia. One school was randomly selected to
be the experimental school while the other was the comparison school. Forty-eight students
were selected from the lower primary (Grades 3 and 4) and upper primary grades (Grades 4
and 5). Based on the students’ previous academic records, they were divided by their teacher
into low, average and high achievers. A mixed methods design was used to evaluate the
inclusion of the strategy intervention within the curriculum. Problem-based instruction (PBI,
which involved plans and planning, was the strategy selected and was implemented within
the regular classroom academic programmes. Teachers from the experimental school
received training in the PBI model and assisted in the implementation of the strategy. The
staff at the comparison school received no training at this point and only used regular
classroom teaching. Significant gains were indicated in the experimental school in academic
tasks, perceptions of ability and some planning tasks in comparison to the control school. The Conway and Hopton (2000) study employed some similar methodology to the present study, including pre- and post-testing, mixed methods approach and experimental and control schools. Results however cannot be generalised as they intervened using a different method (PBI), had younger participants and included teachers as mediators. Nevertheless, they concluded that the metacognitive strategies are most effective if immersed in the curriculum rather than in isolated contexts, which supports the present study’s premise that the metacognitive intervention needs to link to the classroom activities.

Another study by Berger, Kipfer and Büchel (2008) examined the effects of a metacognition intervention in 63 low performing vocational students in Switzerland. Here a quasi-experimental pre- and post-design was used. Teachers were trained and supervised by the researchers, to present a prescribed programme in the first group, selected aspects of the training applied to the second group and the control group only had regular classroom input. Decontextualised and school related activities were presented within the classroom setting over twelve 45 minute lessons. Their results indicated significant gains with the first group, who had explicit programme instruction. Furthermore, they indicated associations between improvements in performance and improvements in strategy use, suggesting that acquisition of strategies may have been responsible for the better performance. This study, albeit had a similar research design to the current study, it differed in the age range of its participants, intervention programme and duration of intervention.

These studies indicate the crucial need to make the philosophy of cognitive education a foundation in any learning situation, irrespective of the programme or strategies implemented. Haywood (1977) supports this view and recommends cognitive instruction in all learning contexts, especially as spontaneous learning may be insufficient for some learners. Cèbe and Paour (2000) in their study in France also showed conclusively how early cognitive education, using “Bright Start”, a cognitive programme promoted reading acquisition, was effective and how it compensated for learners with socio-economic differences. Cèbe and Paour (2000) conducted their study over two different periods of time from 1993-1996 and from 1995-1998. Both samples of kindergarten children were from low socio-economic environments and they were designated by the French government as high priority for special intervention to prevent school failure. The results indicated that the mean scores of the experimental group were significantly better than those of the control group.
after intervention. This was maintained even when they were assessed in Grade one and then in Grade three, confirming that early intervention has a positive impact on learning, and is especially important as these learners were at risk due to their environmentally disadvantaged status.

These are some of the studies emphasising the theory and application of metacognitive instruction. Although their findings cannot be generalised due to some methodological differences, namely, age ranges of participants, different intervention programmes and geographical contexts, they still have implications for the present study, as the South African education system has to accommodate learners from diverse socio-economic environments, as well as to promote the practice of explicit cognitive education. A focused application of metacognitive instruction in South African classrooms may therefore enhance literacy levels, allowing all learners irrespective of their backgrounds to access their cognitive skills, thus preventing scholastic failure. Several approaches of metacognitive instruction are presented in the literature and are discussed below.

5.4 Metacognitive Instructional Approaches

Conway and Hopton (2000), among other researchers, indicate that several metacognitive approaches have been suggested to assist learners in gaining an understanding of both process and content, creating a shift in paradigm from traditional to more progressive methods. Haywood (2001) states that these approaches aim to develop learners who can acquire, elaborate, apply and evaluate their own tools for thinking and learning in a more effective and efficient way. Moreover, these approaches, which include planning facilitation, instrumental enrichment, scaffolding, simultaneous and successive processing, guided participation and PBI have been applied to learners in different contexts.

Different types of instructed learning have been promoted based on their relationship between learning and cognitive processing, and may include direct instruction as well as guided instruction which has been researched with children in the areas of arithmetic and reading comprehension (Haddad et al., 2003; Naglieri & Gottling, 1997; Naglieri & Johnson, 2000). These metacognitive methods have been reported to be beneficial to individuals in other academic areas as well, including writing, skilful speaking and critical listening. The studies
discussed are related to specific domains but the skills encouraged are not restricted and can be used across many areas. Metacognitive approaches should promote flexible knowledge that is not domain specific. The examination of the different instructional approaches provides a better understanding of the metacognitive instructional methods applied, and the evidence-base that will inform best practice.

The two metacognitive intervention studies by Naglieri and Gottling (1997), and Naglieri and Johnson (2000) indicate their application to mathematics. The planning instruction (PI) technique proposed in these studies is one method of metacognitive guided instruction. The researchers investigated whether the PI instruction given by teachers to a class group would have differential effects depending on the learners’ specific cognitive characteristics identified by the CAS. Naglieri and Gottling’s study (1997) indicated that PI was provided to a group of 12 students, aged 9 to 12 years with learning difficulties (LD), in Grade one to Grade six maths groups. The students were grouped according to low and high scores on their planning performance in the CAS. The CAS and its PASS constructs (Naglieri & Das, 1997a) were discussed in chapter 3. Seven sessions of baseline measures and 21 sessions of intervention, using maths as the curriculum context, were presented. The intervention was provided in half-hour sessions two or three times per week. The students were required to engage in self-reflection and verbalisation of the strategies when completing their maths activities. The facilitators guided the learners without feedback or comment on their verbalisations. The results indicated that all students benefited from the PI intervention but those who were in the low-planning group benefited the most, confirming previous studies that the PASS profile was relevant for instruction, i.e. the children benefited from instruction based on their cognitive processing profile. In the second study, Naglieri and Johnson (2000) also provided planning instruction (PI) to 19 students, aged 12 to 14 years from low to middle socio-economic groups, attending Grades six to Grade eight in a public school in California. These students presented with LD and mild mental impairments. A pre- and post-test design was applied. The intervention with PI was conducted over three months, and the results indicated that students with low scores on planning benefited more than students with weaknesses in the attention, simultaneous and successive processing subtests of the CAS, confirming the previous study of Naglieri and Gottling (1997).

In addition, Haddad et al. (2003) replicated Naglieri and colleagues’ studies of PI and maths described earlier, and found similar results with reading comprehension, indicating that the
children's basic cognitive processes, as defined by the PASS theory and operationalised in the CAS, have relevance to instruction. The purpose of the study by Haddad et al. (2003) was to evaluate whether PI would benefit reading comprehension, depending on the (PASS) cognitive characteristics of the children. Forty-five, fourth-graders consisting of 22 boys and 23 girls from general education classes were organised into three groups based on their CAS profiles. Following pre-testing of their reading comprehension, a PI cognitive strategy instruction intervention was conducted by the teacher for an hour over two consecutive days. The intervention encouraged "talk-alouds", reflecting on how they completed the reading comprehension task. The comprehension results at post-test indicated that children who had poor planning scores benefited more from the PI than those with no CAS weakness or those who had a CAS weakness in successive processing, again confirming that the PASS profiles are relevant to instruction.

Furthermore, Hay (2000) utilised process-based instruction (PBI) in his study, which is another method of direct teaching conceptualised by Ashman and Conway in 1997. PBI involved learners developing plans to be used across all areas of the curriculum and revising those plans as changes in their learning arose (Hay, 2000). As direct teaching is frequently rule-based, it may appear very structured in its method but learners need the organisation or structure in order to apply the strategy more effectively. Greenberg (2000a) maintains that learners may often have the implicit understanding but through guidance may be able to make that application more explicit. Hay (2000) reported significant gains in the academic tasks and in the perceptions of ability and planning of the secondary school learners exposed to PBI compared to the learners in the control group. Additionally, by using PBI, the teachers in this study may have taken the time and reduced the pace of the instruction, which may have benefitted the learners. Moreover, the learners reported that teaching strategies, such as modelling, demonstration and feedback, included in the PBI were beneficial. Hay (2000) concluded therefore that specific or explicit metacognitive or cognitive instruction is of benefit to learners.

The studies described above confirm that students benefited from the different metacognitive intervention approaches. It was however noted that the sample size in these studies was small, in addition to different metacognitive intervention programmes used, therefore the findings may not be generalised. Nevertheless, the inclusion of learner perspectives added to the knowledge on cognitive education, and this supports the inclusion of qualitative measures in
the present study. Furthermore, studies, such as Haddad et al. (2003), provided intervention related to the cognitive weakness identified in the cognitive assessment system (CAS) and concluded that improvement for learners was related to their area of cognitive weakness. That is, if planning based on the CAS was poor then planning facilitation techniques improved this skill. This also indicated that the PASS theory was indicative of where to best direct instruction. Haddad et al. (2003) maintained that if the intervention is related to the individual’s aptitude then it will be more relevant. This was referred to as the aptitude-treatment interaction (ATI). Some researchers, however, did not obtain the same findings as Haddad and his colleagues, and in fact found that those with higher general ability did better following the intervention. It can therefore be argued that the metacognitive instruction is not only for individuals with deficits but that it can promote academic success, supplementing the instruction teachers provide in the mainstream classroom, hence the current study opted for mainstream rather than special education..

As the CAS also has relevance for intervention, appropriate approaches can be selected corresponding to the weaknesses identified. Kroesbergen et al. (2003) investigated the effects of metacognitive intervention in his study, where 167 students with low planning scores were given a multiplication intervention. The effectiveness of this intervention, unlike reported studies, did not show a difference across groups. This, they explained, was due to the type of intervention provided in their study. Distinct to the studies of Haddad et al. (2003), and Naglieri and Gottling (1997), and Naglieri and Johnson (2000), presented earlier, the intervention in Kroesbergen’s study did not focus on planning explicitly but only alluded to it in the maths intervention. This seems to imply that the intervention should be specific to the cognitive weakness indicated so that effective outcomes are achieved. Naglieri and Johnson’s study (2000), which looked at the effectiveness of a cognitive intervention on arithmetic computation, confirmed that the intervention must be specific to the cognitive weakness identified on the CAS by applying ATI. Their results showed that the group with poor planning benefited the most with an effect size of 1.4, when compared to the other groups, confirming that the intervention should be specific to the weakness indicated so that effective outcomes are achieved.

The methods in the studies presented also emphasised strategy use, where the learners used these planning strategies to solve novel problems and to develop the resources to revise and apply the new strategies as needed. The strategies used in these interventions and in the
reading literature indicate that several strategies, in addition to planning and problem-based instruction, were in use, including “talk-alouds” or verbalisations, modelling or demonstrations and self-questioning. The essence of these strategies is shared next, as they add value to the understanding of metacognitive interventions, and relate to the intervention process of the present study.

5.5 Strategies in Metacognitive Intervention

Several strategies, both cognitive and metacognitive, are evident in cognitive education and psychology literature. These are discussed in relation to their theoretical underpinnings and their application in the intervention process.

Verbalisation.

Verbalisation was identified as essential in most of the cognitive and metacognitive strategies discussed earlier. It reflects the active process required of a constructivist paradigm, and is linked to Vygotsky’s (1978) language theory. For Vygotsky, language has an activating, social and instructional function which helps individuals to plan and organise their learning. The verbalisation of thoughts is the inner speech referred to by Vygotsky, which he argued is more than the egocentric thought in pre-schoolers, as suggested by several Piagetian scholars (Gruber & Vonèche, 1977; Harris, 1990). Vygotsky (1978) described inner speech as a functional self-communicative and directive verbal mechanism or tool that lies dormant for a while to emerge as inner speech. Furthermore, he believed that inner speech is a private process of thinking in words that allowed the guidance of behaviour through mental comments, reactions, imaginings, organising, hypothesising and planning.

The inner speech referred to in the intervention studies is the verbalisation used by the learner, and is the first step towards self-regulation, which directs and regulates problem-solving abilities. According to Berk (2003), private or inner speech used by the individual is related to the demands of the activity at hand. Inner speech, also referred to as “talk-alouds”, assists the learner in working systematically through the task. Gravetek and Raphael (1985, cited in van der Walt & Maree, 2007) concur that learners use verbalisation and reflection to explore the content and to monitor their planning and knowledge acquisition. When learners express their thinking, they make what is implicit explicit, and they develop clarity in their
thinking in addition to creating a context of social learning. The individual’s verbalisation thus adds value to the self-management process described by Jacobs and Paris (1987).

Verbalisation also includes collaborative exchanges with the teacher or other learners. Through discussion or sharing information the learner generates associations from their immediate learning to other learning contexts, and this is referred to as transcendence as described by Feuerstein et al. (1980). Joseph (2006) in her study with secondary school students found that discussions on their reading comprehension strategies assisted them in internalising the learning. This confirms Vygotsky’s view that learning, which originally began as a social exchange (interpersonally), becomes internalised (intrapersonally) and promotes the cognitive development of the individual (1934/1987). The skill of verbalisation is thus necessary for independent and interdependent learning and development, as learners use self-talk to manoeuvre through a task, reflecting, monitoring and evaluating their progress as well as learning through sharing information.

**Modelling and demonstrating cognitive skills.**

Over and above verbalising one’s thinking, demonstrating the process is also an effective strategy for internalising learning. Joseph (2006) discussed the importance of the teacher demonstrating the cognitive skills involved in the process of teaching. This method of sharing and modelling the strategies is an effective metacognitive instruction. The students in Joseph’s secondary school class were able to experience the reflections from the teacher on what thinking is involved and experienced, when she teaches. According to Joseph (2006), “mental modelling teaches students metacognitive awareness through direct instruction, and is a valuable investment in students’ cognitive development” (p.35). It can thus be argued that modelling is an effective and relevant strategy that all mediators in any learning situation can use.

**Self-questioning.**

Self-questioning, which involves teaching students to generate questions related to the text being read, has been described as a relevant strategy. This metacognitive instruction promotes skills in comparing and contrasting, synthesising and evaluating information (Joseph, 2006). As mentioned earlier, Haywood (1977) regarded reading as the content and these cognitive strategies are required for more effectual comprehension. Learners monitor their
comprehension through questioning to promote understanding. Self-questioning used both in text and oral discussion facilitates clarification of thought (Hmelo-Silver & Barrows, 2008).

**Self-regulation.**
Self-regulation promotes accountability in the learner, where the learner takes control of their thoughts and actions in a task, avoiding hasty and impulsive responses (Greenberg, 2005a). This metacognitive skill is discussed further in the intervention plan for this study.

**Explicit Feedback.**
Explicit feedback on performance was argued by Campione (1987) to be an effective strategy that can increase output and maintain success. It appears that evaluation of the outcomes of any activity shared with learners can guide them in their approach to other subsequent tasks. Teacher feedback to the learners was also discussed in chapter 4 on instruction and learning.

Even though there are several variations of cognitive and metacognitive approaches in the literature, it remains difficult to compare methods as each is varied in terms of its methodology and is at different stages of its application in different contexts. Although the studies of Haddad et al. (2003), Naglieri and Gottling (1997), and Naglieri and Johnson (2000) may have different designs, the philosophy underpinning their study is similar to the intervention process implemented in the present study, which aims to show that learners will reflect on their thinking and apply strategies appropriately when the process of learning is mediated. When examining studies on cognitive and metacognitive instruction, it is also important to take into consideration that learners are heterogeneous and may perform differently, and that their performance may be linked to task and strategy variables, hence the limitation with generalisation of the results (Flavell, 1987).

5.6 **Effectual and Ineffectual Application of the Metacognitive Instructional Process**

Apart from the benefits of such instruction, as suggested by these studies, some learners continue to have difficulty retaining instructions and retrieving them when needed. Although this research aims to show that metacognitive instruction has an effect on all learners, the level of modifiability may differ depending on certain variables. Therefore the level of transfer and the sustained effects of the intervention for each learner may be different. Some
learners may not retain the strategies for several reasons, some of which may relate to distal and proximal factors as described by Feuerstein (see chapter 4). Poor problem-solving abilities in the study by Naglieri and Johnson (2000) involved “failure to organize the math; inadequate reflection on the best procedures used; difficulty analysing the demands of the problem and failure to carefully monitor and check their work” (p.591). Difficulties with retaining and retrieving metacognitive instructions are not applicable just to maths but may be observed in other activities requiring systematic exploration, planning and execution. Several reasons that might affect retention and transfer of strategy use are discussed next.

**Metacognitive knowledge base.**
Van der Walt and Maree (2007) stated that an ineffective knowledge base may be related to the learner not having sufficient metacognitive knowledge and experience, as well as limited interrelationships between these schemas, which hinder the application of metacognitive strategies in a task. The knowledge base mentioned by Van der Walt and Maree (2007) refers to what Brown (1987) talks about as abstract reflection, the ability to hypothesise and evaluate skills, which also relates to Piaget’s formal operation stage of development. Flavell (1987) defined metacognitive knowledge as acquired world knowledge related to psychological matters. He stated that metacognitive knowledge includes person, task and strategy variables, which interact at some level. Knowledge of person relates to how learners understand their resource capacity and themselves as a person in the world. Knowledge about the task includes its familiarity and its level of difficulty so that processing demands can be predicted; and lastly strategy variables relate to the cognitive goals for making cognitive progress and implementing metacognitive strategies to monitor this progress. Given Flavell’s description of metacognitive knowledge, one can understand that learners who have limited insight into their capacity will not allocate appropriate resources nor select the relevant strategy for their task, resulting in poor performance. Furthermore, this will influence their levels of motivation, reducing affect. Learners who are unable to access their knowledge base will have difficulty with application of strategies, indicating a problem of access to resources which is discussed below.

**Differences in home and school language.**
Some learners may have difficulty transferring learning strategies effectively as a result of having a home language that is different from the language of learning and teaching (LoLT). This is described as a language difference, and the complexity and abstractness of language
used in teaching at higher grades complicates this issue further. Learners may also have less than adequate comprehension of expository and narrative texts due to limited exposure, while others may have language impairments (Owens, 2010). Language differences can be seen in a similar light to cultural differences, and according to Feuerstein et al. (1980), such learners should show higher modifiability than learners with language disorders. To exclude the latter as a variable, a language screening was conducted in the present study, and the learners’ language competency was evaluated to determine whether the differences, if any, were due to specific language disorders or due to language differences.

**Classroom instruction.**

The type of instruction used by the teachers may also influence transfer of learning strategies, and this was discussed at length in chapter 4 on classroom discourse. Metacognitive instruction is based on a constructivist paradigm and a progressive methodology hence it should promote transfer of learning regardless of type of instruction.

**Linking strategy to learning content.**

Less than adequate academic performance may also be associated with cognitive instruction which does not link strategies to a specific genre or subject area. The learner requires consolidation of their learning, which can then be transferred to other contexts. Glaser and Brunstein (2007) demonstrated that metacognitive self-regulation together with strategies in composition-writing proved more effective than metacognitive strategies alone. Their study used a pre- and post-test follow-up design, and their sample was divided into three groups. The first group was given self-regulation and writing strategies, the second group only self-regulation, and the third group was given didactic lessons in composition-writing. The findings indicated that when the cognitive skill of self-regulation was combined with a specific genre of skills or activity, better performance was achieved. This highlights the need for cognitive instruction to be part of the curriculum so that relevance is ensured and that it does not become merely another programme taught in isolation. This is supported by the Conway and Hopton (2000) study, mentioned earlier and concluded that the metacognitive strategies are most effective if it is part of the curriculum.

**Transcendence or bridging.**

Metacognitive strategies in the absence of bridging or transference, which is an underlying feature of Feuerstein’s MLE, may also hinder better performance. In this case the learners
may not have discovered a link between the classroom input and other contexts for learning. Creating links between the classroom learning and other learning contexts is important so that learners can transfer and apply what they have learnt to problem-solve in other situations (Greenberg, 2000a, 2005a; Shlomo, 2001). The concept of transference relates to transfer discussed in chapter 4. Haddad et al. (2003) identified the failure to examine whether the gains in reading comprehension remained over time, as a limitation in their study, giving rise to the question of maintenance of performance. Moreover, Campione (1987) mentioned that there was still the issue of generalisability and sustained performance which first arose when metacognitive research started in the 1970s and continues to be questioned in recent studies.

*Ineffective resource allocation.*

Some learners may ineffectually access resources because of central auditory processing disorders (CAPD) or changes in demands in the curriculum. Learners who are effective planners are flexible and display more effective resource allocation. According to Brown (1987), learners have a global view of the goal and do not focus on local content. When reading, learners who allocate all their resources to the decoding phase, have none available for comprehension or meaning making. Effective allocation of resources by a learner includes attention and memory, which impact on information processing, ultimately influencing the outcome. Furthermore, Wittwer and Renkl (2008) indicate that students who experience information redundancy in classroom instruction, appropriate resources incorrectly, and thus have few resources available for cognitive processing of new information.

*Cognitive Processing.*

Furthermore, poor outcomes following metacognitive instruction may be related to cognitive processing in the learner. Teachers need to be aware that learners process information differently. According to Feuerstein et al. (1980), “the deficiency may not relate to the content or the operational level but in the underlying functions upon which successful performance of cognitive operations depend” (p.71). Cognitive functions can be understood within the framework of Feuerstein’s three phases of the mental act, i.e. input, elaboration and output (Skuy, 1996). These three phases are interrelated even though they were presented separately for discussion in the theory chapter on cognition and cognitive theories. A breakdown at any of these cognitive levels will result in the learner not engaging effectively with the task. Feuerstein et al. (1980) also includes affective-motivational factors which must be considered when attempting to understand the learning process.
Affective and Motivation of the Learners.

Feuerstein et al. (1980) indicate that affective and motivational factors influence the attitudes of the learners, especially those disadvantaged in the process of learning. Cottrell (2001) also confirmed that factors intrinsic to the learner such as motivation and willingness to learn influence learner performance resulting in individual differences between learners in a group. Feuerstein et al. (1980) state: “these attitudes may affect the general involvement with cognitive tasks, as demanded by academic studies, tests and real life situations” (p.74). Affect and motivation in addition to cognitive skills are hence foundational for learning.

From this discussion on diverse performance in learners, it is obvious that instruction plays an important role in the generalisation of knowledge and skill from one learning context to the next. Metacognitive instruction can thus ameliorate ineffective cognitive functions and develop learners into independent individuals who benefit from individual and group learning contexts, and are able to reflect on the strategies discovered. This was confirmed in studies by Haddad et al. (2003), and Naglieri and colleagues (1997, 2000). The majority of the studies regarding cognitive instruction refer to learners with some form of known academic difficulty such as learning disability (LD) and cognitive delays. There is, however, a paucity of documentation on the effectiveness of metacognitive instruction within a general mainstream school population. South African mainstream schools offer a valuable opportunity to assess the effectiveness of such a programme on learners from very diverse backgrounds, thus providing relevant context. Metacognitive instruction is explored in the present study, and the intervention focused on mediation of metacognitive strategies, where the learners were encouraged to think about their thinking when applying the strategies, as well as to formulate links for effective transfer to reading and other learning contexts. The intervention was examined within a mainstream educational context, where a diversity of learners is accommodated. Some learners with academic difficulties may be within the target groups selected for the study. This is discussed further in the following section on intervention.
5.7 Metacognitive Instruction in the Current Study

5.7.1 Metacognitive Instruction in the Classroom: Product and Process:
The researcher’s epistemological assumption in the present study is that all learners who are given an opportunity of mediation can learn according to their potential. Divergent approaches to metacognitive instruction can be found in the cognitive literature, but are limited. This study therefore examines a metacognitive intervention perspective that is important for learning and is based on the fundamental premise that reflection and self-awareness of the process and the content of the activity are essential. In addition, cognitive skills for analysing, reasoning, organising and evaluating were included, and specific mental operations based on the CEA programme (Greenberg, 2000a) were selected and made explicit for the learners.

The concept of metacognitive instruction provided the focal point in the current study, as the researcher believes that learners can only develop into life-long learners if they engage with their own thinking and reflection, thereby discovering more about their own learning. This is not possible if they are merely taught strategies without the opportunity to reflect on their thinking, hence the term metacognitive, rather than cognitive instruction, is used. According to Joseph (2006), metacognitive strategies allow learners to reflect on their cognitive processing which permits them to use their academic strengths to develop additional skills, progressing towards intellectual maturity. The metacognitive instruction and the strategies selected for this intervention study are thus firmly grounded in the theories of language, cognition, social, as well as developmental psychology and cognitive education.

From the studies discussed earlier in this chapter, it can be seen that several methods of cognitive and metacognitive instruction have been applied in education, both internationally, and less frequently, locally. The reported benefits from these interventions confirm the effects that metacognitive instruction has on learning. Most studies discuss scholastic contexts but metacognitive instruction can be applied to many other intervention contexts, including the work of Haywood and colleagues in the area of traumatic brain injury (TBI) and cognitive education (Haywood, 2001). Furthermore, the studies reviewed had different age ranges, with the Conway and Hopton (2000) study, having younger participants and Berger et al. (2008), intervening with older learners. Even though both these studies used a pre- and post-test research design similar to the present study, their intervention programmes were different to
the CEA utilised here, hence the findings from these studies cannot be generalised. Their successes reported in the literature, together with the current researcher’s training and experience in cognitive education provided the impetus for the intervention study described in this thesis.

The framework of the intervention process in the present study was based on Feuerstein’s theories of SCM and MLE, Vygotsky’s ZPD, as well as Greenberg’s cognitive enrichment advantage (CEA) as these approaches are grounded in well researched theory and practice. In addition, the relevance of the PASS theory to instruction is important, especially as it conceptualises cognitive processing which is fundamental to learning (Naglieri & Das, 1997a) and reading (Das, 2001). These theoretical frameworks were discussed in chapter three on cognition and cognitive theories. These theories indicate promising application, not just in this study, but also more broadly as they demonstrate relevance for instruction within the South African education context.

5.7.2 Theoretical Background for the Metacognitive Intervention:
The intervention framework utilised was based on cognitive education and psychological principles. Greenberg’s cognitive enrichment advantage (CEA) (2000a, 2005a) is described in detail as it formed the core programme selected as the content for the metacognitive instruction in this study. Permission was granted for its inclusion in the intervention (see Appendix T). Feuerstein’s theory of structural cognitive modifiability and his criteria of MLE (Feuerstein et al., 1980) and Vygotsky’s social construction of knowledge (Vygotsky, 1978, 1987) formed the philosophy on which the CEA programme (Greenberg, 2000a, 2005a) is based. CEA is also based on the premise that teachers and learners must have explicit knowledge about how to learn so that effective learning can take place. The goal of CEA is to teach learners how to learn through the use of a shared vocabulary by all involved, regarding specific cognitive processes, affective and motivational approaches to learning (Greenberg, 2000a, 2005a). As this study is in agreement with the view that metacognitive instruction involves more than knowledge, and includes affect and motivation, the CEA programme seemed suitable for inclusion. The selection of theory, content and process of the metacognitive intervention in this study is presented to create a framework for understanding the applied instruction. The researcher’s belief that all learners can benefit from mediated learning instruction, as proposed by Feuerstein, forms the cornerstone on which this study is
based. The CEA programme, the details and the selected “blocks and tools” implemented in the intervention are presented below.

5.7.3 Cognitive Enrichment Advantage (CEA):

CEA was developed by Greenberg (2000a), based on the theoretical foundations of Feuerstein and Vygotsky. Its teaching and learning approach is based on the premise that learners who understand how they learn are able to develop personal learning strategies that can help them cope with new learning in any context. Furthermore, Greenberg (2000a) states that “educators and learners who understand how best to facilitate learning realize the significance of personal worldviews and cultural beliefs as developing the foundations of their learning potential” (p.19). This premise has implications for the learners in South Africa, and based on the results of observed and anecdotal reports of its application in certain schools, the study was initiated.

CEA consists of 12 building blocks of thinking and eight tools of learning (Appendices U-V). The goal of CEA was to create a learning environment, where learners and teachers explored the learning process, socially constructing knowledge. The programme was first applied in an Appalachian setting in East Tennessee, USA, and it was then introduced to several countries including the USA, Belgium, Brazil and South Africa (Greenberg, 2000, 2005). The CEA programme is currently applied in selected schools in two of the nine provinces in South Africa. The basic course in CEA was initially introduced by Greenberg in 2000 and has since been followed by the trainers’ course in CEA, which resulted in the researcher being certified as a trainer. Several basic courses have subsequently been conducted among teachers and therapists, with certain schools adopting the whole school approach versus some who apply it in their individual mediation. The metacognitive instruction based on CEA also confirms the importance of the mediating role that teachers should play, and the importance of creating learning environments which facilitate reflective and critical thinking. Orechkina and Greenberg (2007) maintain that the teacher facilitates learners’ appropriation of metacognitive knowledge by engaging them in their reflection on the “how” of learning. The process in the metacognitive instruction is thus key, while the content is a means through which the process is mediated.

Hurte (2004) compared the scaffolding approach and the CEA approach in enhancing critical thinking (CT) skills in a study with first-year students at the University of Tennessee. A
modified pre-test and post-test design was used. The pre-intervention phase included the first three CT assessment administration sessions to obtain a baseline of the participants' critical thinking ability. It also included a two-week period of direct instruction of CT knowledge to all students. Following the pre-intervention phase, matched pairs were randomly assigned to CEA groups and scaffolding groups. The scaffolding intervention participants received predetermined verbal prompts and cues to support their CT. In the modified CEA intervention, participants were encouraged to create their own personal strategies, based on meta-strategic knowledge (building blocks of thinking and tools of learning). In addition, decontextualised principles for using the "block" and "tool" were encouraged to transfer learning to other situations. The results indicated that no significant change in CT in the CEA group based on both assessment measures was indicated. The scaffolding group, however, showed decreased performance on the Watson-Glaser Critical Thinking Appraisal (W-GCTA). It was concluded therefore that the modified CEA intervention supported the retention of the participants' CT skills and facilitated learning transfer while the scaffolding approach did not positively influence the participants’ CT skills. Although Hurte's study has a different methodology, in terms of assessment and intervention measures, as well as age range of the sample, to the current study, its results suggested that CEA programme has potential application in cognitive education.

The concepts of mediated learning and metacognitive strategies from the CEA programme were not applied verbatim in the present study as the purpose was not to evaluate the efficacy of the programme but rather the effectiveness of the metacognitive instruction on reading comprehension provided by the primary interventionist during the intervention phase in the classroom. As intervention is a dynamic process, additional cognitive skills were introduced, including goal setting and comparison. However, to maintain a structured approach, the names of the "blocks and tools", described in the CEA programme, were used. The cognitive processes are referred to as "building blocks of thinking" and the affect/motivational approaches are referred to as "tools of learning". The CEA "blocks and tools" were mediated first in a decontextualised manner, and then bridged into reading comprehension activities. The actual process of mediation is examined later in this section and in the method chapter. The rationale for selecting reading as a content area was based on the poor reading levels reported in the South African education system, which confirm a relevant contextual need (see chapter 2 on education).
5.7.4 Reading: its link to the intervention

The intervention involved metacognitive instruction specifically applied to reading comprehension but the metacognitive strategies were also bridged to other general areas of learning. Reading comprehension was selected as the subject area as it is fundamental to all learning and impacts on academic success. In addition, according to Pandor (2006), the former minister of education, the low literacy levels reported in South Africa need urgent attention, and thus this contextual analysis informed the current study. Glaser and Brunstein (2007), and Strassman (1997) indicate that the metacognitive strategies linked to a specific subject genre or activity yield better outcomes than a more general approach, as mentioned earlier, therefore reading comprehension was selected as a specific subject area. Although this may indicate a domain-specific approach, the strategies were generalised to other content areas as well.

Reading comprehension as a content area requires active engagement between the learner and the teacher. For readers to be successful in their application of metacognitive skills, they have to regulate their metacognitive knowledge of person, task and strategy, and metacognitive experiences (Flavell, 1987). This may occur before, during and after the reading of a text. Strassman (1997) indicated that if the readers are less experienced or have limited practice in reading, they will have limited opportunities to exercise their metacognitive knowledge and metacognitive control. Several research studies in metacognitive education, including those of Cèbe and Paour (2000), Eilers and Pinkley (2006), Haddad et al. (2003), and Marsha and Camahalan (2006) indicate that metacognitive instruction improves learners’ reading comprehension. Haddad (2000 cited in Haddad et al., 2003) found consistent performance in single case design, when planning facilitation was used with reading fluency and reading accuracy. A follow-up study by Haddad et al. (2003), mentioned in previous sections, anticipated that children with a weakness in planning on the CAS would have better outcomes on reading comprehension when planning facilitation strategies were applied. This was confirmed, and the group with poor planning at post-test showed substantial gains in reading comprehension, with an effect size of 1.52. The cognitive strategy of planning facilitation seemed to have been beneficial for these children. Haddad et al. (2003) commented that planning facilitation strategies have no set procedure, and can therefore be used successfully across settings. Such examples are beneficial for schools that are financially disadvantaged, and are unable to afford the different “thinking” programmes.
In the study by Cèbe and Paour (2000) a cognitive programme, “Bright Start”, introduced in kindergarten continued to impact on the reading skills of the children in Grade one to Grade three. They pointed out that the effects of cognitive education were seen with greater clarity when the reading tasks were more complex as in Grade two and Grade three than in the simpler tasks of reading new words in Grade one. According to Cèbe and Paour, this was due to more complex tasks requiring higher level skills and greater self-regulation. Their study indicated that cognitive strategies were best seen generalised in reading activities, confirming that cognitive and metacognitive strategies do have a positive influence on reading comprehension. The results however have limited generalisation, as the context of this study is different to the current study, even though their participants were from disadvantaged backgrounds. Additionally, the intervention was applied to the preschool level, which is an important period for foundational skills required for literacy development. The authors also indicate that they were “unable to separate the effects of the programme and its application from the effects of the personal characteristics of the teachers who applied it” (Cèbe & Paour, 2000, p.196). Despite these reasons, this study has positive contributions to make, regarding the influence of cognitive education on reading, and especially on children from underprivileged environments.

A further study by Marsha and Camahalan (2006) looked at the effects of metacognitive intervention on reading in children with dyslexia. A single case, quasi-experimental design was used on four students with dyslexia. In addition, they had English as their second language. Observations were conducted before and after the intervention phase, and the intervention was provided for a month. The post-intervention testing indicated improved reading comprehension scores for all four children. Marsha and Camahalan (2006) study’s results confirmed that these students with dyslexia were able to achieve their reading goals given the intervention. This study is similar to the current study in its pre-post design, but differs in the type of participants, age range and intervention strategies. Limitations of this study are not indicated. Despite this, the results cannot be generalised because of the sample size and the short duration of the intervention process.

These studies demonstrate that when students are explicitly taught metacognitive strategies, academic achievement is possible. It can be deduced that even though a great deal of time is reported to be allocated to literacy in schools internationally, the instruction presented may not be meeting the needs of many learners (Barton & Sawyer, 2003). According to Eilers and
Pinkley (2006), the comprehension questions generated by the teacher for any text, generally measure the content. Strategies to enhance comprehension skills are however often not explicit in reading lessons. Consequently, for learners to become effective readers they need explicit instruction in specific reading comprehension strategies that can be generalised and applied to all reading activities. The purpose of the study by Eilers and Pinkley (2006) was to assess the effectiveness of explicit instruction of the metacognitive strategies on first graders’ reading comprehension. A pre- and post-testing design was used, and the findings indicated that a significant increase in students’ reading comprehension scores, were noted following the intervention. They concluded that explicit instruction of metacognitive strategies is an effective instructional method for improving reading performance. Their study used an interesting intervention methodology of whole group followed by small group practice, which promoted scaffolding of the strategies introduced. The findings of this study may not be generalised because of sample size and the age range of the participants.

These studies on reading, nevertheless, indicate positive outcomes with significant gains, following the metacognitive intervention. Although the methodologies in these studies are diverse and cannot be compared, the underlying principles are similar, in that individuals seem to better their performance when given explicit metacognitive instruction. The results of these studies confirm that metacognitive instruction has relevance for increasing reading comprehension specifically, and learning in general. The present research therefore hypothesised that metacognitive instruction will impact positively on the reading comprehension skills of the Grade six learners selected. It also included, in addition to the CEA programme, questioning, linking to prior knowledge, verbalisation and “talk-aloud” strategies. These are further explained in the process of mediation discussed next.

5.7.5 The Process of Mediation:

As discussed in chapter 3, the metacognitive intervention in the present study is based on the theories of Piaget, Vygotsky and Feuerstein, as well as the PASS theory of Das et al. (1994). The intervention process involved active reflection on thinking and the construction of knowledge by the learners. The hierarchical stages of knowledge development of Piaget were therefore considered as learners in Grade six are expected to have acquired the cognitive competence to engage with abstract and higher levels of thinking. In addition, the theories of SCM, MLE and ZPD were relevant, as the cognitive instruction in the design involved an active interaction between a mediator and the learners in a classroom context (Feuerstein et
al., 1980; Vygotsky, 1978). The tasks selected and the instructions provided aimed to create a ZPD for the learners. Das et al. (1994), PASS theory was also considered as these cognitive processes were involved in the intervention process.

The PASS model of cognitive processing provides a comprehensive understanding of how learners process the information from their text to make meaning, which is the essence of reading. Moreover, the cognitive processing described in the PASS model, was linked to the processes in the CEA metacognitive instruction. The PASS model, understood in the light of Luria’s anatomical description of the brain, provides further theoretical basis for this study, as both selective and divided attention are required when comprehending text. Furthermore, simultaneous and successive processing are involved in the comprehension of the meaning of sentences, as well as in the understanding of the syntax of sentence. Planning, in comprehension tasks, is also essential as systematic integration of information forms the mental representation for effective understanding (Bishop, 1997). Furthermore, the intervention involved deductive reasoning, a type of metacognitive strategy whereby the learner infers strategies to comprehend text, making it his or her own. The importance of such discovery learning cannot be underestimated, and Haywood (2003) indicates that learners need to engage in deduction rather than being provided with all the information.

Several concepts which underlie the CEA metacognitive intervention are fundamental in understanding the process of intervention in this study. These are mediation, active participation, dynamic process, scaffolding, verbal exchanges, pragmatics and modelling. The concepts that were not discussed in previous chapters on language and cognition are included and linked directly to the intervention.

*Mediation* is the process that emerged in the intervention. Haywood (2003) defines the construction of knowledge as being conceptual, procedural and metacognitive. Conceptual knowledge refers to “the understanding of abstractions and generalisable concepts, and constitutes fundamental modes of conceptualising the world” (Haywood, 2003, p.72). Procedural knowledge refers to the sequence of how the task has to be carried out. Haywood (2003, p.72) describes procedural knowledge as “cognitive application of conceptual knowledge”. Metacognitive knowledge therefore refers to the individual’s own cognitive ability to select and apply strategies when problem-solving. Therefore, during the mediation
process, procedural and metacognitive knowledge become focal points which influence the conceptual input to the individual.

The role of the primary interventionist or mediator was to allow the learners to discover the new knowledge through learner interaction and discussion. Conceptual knowledge was the goal intended to be achieved through procedural and metacognitive strategies. The process of mediation encouraged the learners to reflect on their thinking by analysing their thought processes and exploring alternative perspectives to arrive at a more salient response. Questioning techniques were used to promote the analysis of thought and through guided scaffolding learners were encouraged to make decisions regarding their response. Haywood (2003) confirms that using methods such as deductive and inductive reasoning, represents a different level of learning than when learners are given the information directly.

The process of engagement with the learners was a mediated dynamic process which was marked by continuous activity and interchange of ideas. The mediated learning criteria described by Feuerstein were considered, as the quality of the mediation was important for effective learning. The interventionist planned each session, in consultation with the class teacher, based on the specific intention. They nevertheless had to be flexible enough to accommodate the thinking that was generated by the learners through verbal dialogue. Intentionality was expressed in the interventionist’s aim when sharing a metacognitive strategy as well as when engaging the learners in constructing knowledge. The information on strategies for reading comprehension, interpreting, guiding and providing meaning to the stimuli were provided through verbal exchanges, making the learning in these interactions intentional. The interventionist, in this study, created and maintained reciprocity through active engagement with the learners. Reciprocity is one of the key criteria in Feuerstein’s MLE as it sets the context for interchange between the interventionist and the learners (Feuerstein et al., 1980). Meaning was negotiated for understanding and is discussed further on, relating to verbalisation, sharing and questioning. The third aspect of MLE, that is, bridging or transcendence of the new learning was used to link the classroom input to other learning situations, promoting generalisation of the learning. These approaches thus formed the three core criteria of Feuerstein’s MLE (Feuerstein et al., 1980), which was essential to this study as the metacognitive instruction presented by the interventionist to the learners was an opportunity to engage in an appropriate and meaningful type of interaction.
Verbal exchange or verbalisation is an essential component of an interactive classroom environment and should not be minimised or limited as learners will not otherwise experience sufficient opportunity to reflect on their thinking, while negotiating meaning. The oral discussions allow for implicit knowledge to be made explicit, developing meaning and understanding through sharing. According to Naremore et al. (1995), negotiating meaning is the hallmark of conversation and thus learners construct meaning in their oral discussion, building on their comprehension. The social context of the classroom groups permits the development of a discussion, with learners sharing their understanding of the concepts covered. This is crucial for improved understanding and adds to the definition of metacognition, where the individual through discussion adapts the cognitive activity, resulting in improved comprehension (Joseph, 2006). Verbalisation was important in the present study, as the criterion of meaning is foundational in reading comprehension, and unlocking the understanding through the use of higher-order questions will assist learners in reflective thinking, which develops a better understanding of texts that they read. Moreover, through verbalisation, learners in this study were given strategies to self-regulate their thinking and performance, which should increase their competence or their perception of success in any given task and not necessarily to the successful outcome of the task (Skuy, 1996).

The primary interventionist encouraged the learners to engage in oral discussions, to verbalise their thoughts and thereby reflect on their thinking, and through bridging, to link the new metacognitive concepts to their home, school and social contexts. Verbal discussions were specifically promoted to make the learners’ understanding explicit. The learners’ ability to formulate an understanding of their learning process can be understood in terms of the cognitive developmental theory of Vygotsky, where metacognition regulates this learning (Wood, 1995). Joseph (2006) states that discussion of learning strategies encourage learners to explore their understanding of how they learn, promoting insight into their skills. It also encourages the learner to look at optimistic alternatives, broadening their perspectives. As this is not a spontaneous process with all learners, explicit instruction and frequent reminders are necessary. This is reiterated by Hay (2000), who points out that learners may have the implicit understanding but through guidance may make the application more explicit.

The concept of sharing is associated with verbalisation. Sharing of information in verbal dialogues allows for individuation and self-change, which means that one becomes aware of
one’s views through discussion with others (Cornfield, 2001). It also generates alternative points of view, reframes the situation and exposes the learner to different perspectives. Additionally, when different perspectives are considered, the learners’ world view increases, and through co-operation and collaboration, learning is established. Greenberg (2000a, 2005a) argues that this process encourages interdependence among learners, promoting lifelong learning. It must be noted that new tasks introduce challenging feelings which can inhibit or promote learning. Nevertheless, learning can be achieved through the effective interaction between the interventionist and the learner. The learner is encouraged through sharing to identify the goal of the task and deal with a section at a time so that the learner does not feel overwhelmed. Furthermore, monitoring of thinking also aids in achieving successful outcomes. The learners, through collaboration with classmates, were encouraged to develop a feeling of belonging, which was permitted by the interventionist through a mediated instructional framework.

In addition, scaffolding is an important part of the interaction by the interventionist as it indicates support, allowing the learners to perform within their ZPD (Hoff, 2005). According to Greenberg (2000a, 2005a), when learners receive high quality mediated learning, they learn how to learn, developing tacit knowledge. Through the metacognitive intervention, this tacit knowledge about the process of learning is made explicit. The process of questioning used by the interventionist, through verbal dialogue and scaffolding, to unlock the meaning is essential in a mediated learning experience. Moreover, the notion of assisting learners to a higher level of thinking was included in this study.

The type of questions used in engaging learners is also important, and may have both social and cognitive functions. Hmelo-Silver and Barrows (2008) indicate that questions can help with “goal setting, guiding cognitive processing, activating prior knowledge, focusing attention, promoting cognitive monitoring and display of knowledge” (p.53). Questioning is fundamental in facilitating exploration of the meaning of concepts and developing better understanding among learners. Modelling by the interventionist assists the learners to learn by example. The type of questions modelled help learners to develop skills which make use of metacognitive abilities. This is acknowledged by Joseph (2006) who maintains that modelling encourages learners to develop an awareness of how skilled readers think when approaching a task. Modelling or demonstration by teachers is insufficiently applied in much
South African classroom instruction, as indicated in the van der Walt and Maree (2007) study.

Furthermore, interest in metacognition as a verbally recruited tool or skill for improving academic ability has been influenced by Vygotsky’s work (Witt, 1998). For Vygotsky learning begins on two levels - first in a social exchange, interpersonally, and is then internalised (intraperonally), resulting in development (1934/1987). This interpersonal exchange links to the skill of pragmatics. According to Owens (2005), pragmatics is the area in which the interaction of language and socialisation is evident. As language is a social tool in engagements, effective use of language is therefore paramount. Pragmatics, as discussed in the previous section on language, is another concept that is fundamental for scholastic progress to take place and was included in the intervention, as the interventionist encouraged active participation of learners when they unlocked the meaning of the CEA blocks and tools, and linked it to their reading comprehension activities.

Finally, the context of the classroom is also an important aspect to note, and an appropriate environment was created for verbal dialogues, making the learning relevant and meaningful. The impact of the social environment is an important element in interactionist theories (Witt, 1998). Carter (2005) adds that social development is essential for intellectual development, for free thinking and construction of meaning. The cognitive processes of non-egocentrism and decentration increase and combine to enable the learner to become a more effective communicator, promoting learning in a social context (Owens, 2005). The demands of the classroom thus require major shifts in how the learner uses his or her language. The school script must be understood so that the learner adheres to the rules expected in this context (Bashir et al., 1998). In the current study, the learner had to have good pre-suppositional skills (understanding another person’s perspective) when conversing with other learners and the mediator (interventionist/teacher). Additional pragmatic skills of topic initiation, maintenance and termination, as well as conversational repair strategies also have to be in place, as it promotes the interchange among learners to construct knowledge (Norris, 1998). Construction of meaning is influenced by language and the cultural context in which the language is used (Bruner, 1997; Kumar, 2006; Vygotsky, 1934/1987). Therefore, through social interaction, which is mediated by speech and language used, the learners were encouraged to construct knowledge, in order for it to become internalised, resulting in understanding.
From the above discussion, it can be seen that the process of mediation in this study was an eclectic dynamic process, and was influenced by the learners, the interventionist, the content of learning and the classroom context. However, the underlying principles of the cognitive theories of Feuerstein et al. (1980) and Vygotsky (1934/1987) remained. Intervention programmes that have a sound theoretical base are essential for testing the efficacy of procedures so that the outcomes for the learners are relevant (Schiavetti & Metz, 2002). This concept of evidence-based practice (EBP) was introduced and discussed in the introductory chapter.

5.7.6 Metacognitive programme: Cognitive Enrichment Advantage (CEA)

In this study, CEA’s metacognitive and metastrategic knowledge included categories from “building blocks of thinking” and “tools of learning” described below. The blocks of thinking included approaching the learning experience (exploration, planning and expression), making meaning of the learning experience (working memory, making comparisons, getting the main idea and thought integration), and confirming the learning experience (precision and accuracy, space and time concepts, problem identification and selective attention) (Greenberg, 2000a, 2005a). The building blocks are described with examples to illustrate their application (Greenberg, 2000a, p.61-93):

Approaching the learning experience.

Here learners have to explore what is required of them in any given task. Moreover, they need to plan systematically so that the outcome achieved will be effective. This building block of thinking entails the following three processes:

- **Exploration**: The learner has to search systematically for information needed in the learning experience. As not all information is often available, the learner has to be selective and assemble the information required.
- **Planning**: Here the learner has to organise the information gathered and systematically plan the approach in the learning experience. This will depend on the goal of the task. The steps selected must be appropriate and the learner has to anticipate when changes will be required, and make the necessary shift.
- **Expression**: The learner has to communicate their thoughts and actions carefully in the learning experience.
These processes can be further understood in the following example. When approaching a task e.g. a project, the learner will first need to find out what is required, what materials are needed and how it needs to be presented (exploration). The learner needs to plan the project systematically from gathering information on the topic, the materials required and the steps to follow (planning). Furthermore, the learner needs to be aware that if a plan selected does not succeed, an alternative solution is needed. The learner then has to communicate the presentation of the information using modes of writing, illustration or oral presentation (expression). Following these steps systematically in a logical manner will result in the best outcomes.

Making meaning of the learning experience.
In this second building block of thinking, the learner has to retrieve, compare, synthesise, integrate and compare information. It comprises multiple skills namely:

- **Working memory:** The learner has to use transient memory processes effectively to engage with the information.
- **Making comparison:** Here the learner has to discover similarities and differences among some parts of the learning experience.
- **Getting the main idea:** The learner has to identify the basic thought that holds the ideas together.
- **Thought integration:** The learner has to sequentially and simultaneously integrate pieces of information from several sources to formulate a complete thought. This will also reflect on their working memory capacity. Thought integration is a basic part of processing necessary information to make meaning within a learning experience. This reflects the learner’s cognitive processing ability.

The example of the project explained above can also be understood in terms of making meaning of the learning experience. First the learner needs to process, retrieve, compare, synthesise and integrate information, sequentially and simultaneously for a better understanding so that the conceptualisation of the project is meaningful (thought integration). The processing of the information happens in working memory in order to achieve understanding and this knowledge is added to the long-term memory. This involves the elaboration phase of cognitive functions, which has a major influence on the processing, hence the learning outcomes (Feuerstein et al., 1980). Once the information is conceptualised
and integrated, the learner needs to formulate a topic, which reflects the main idea of the project.

Confirming the learning experience.

In this final building block of thinking, the learner has to clarify, validate, correct and define the needs. The processes involved in attaining this building block are:

- **Precision and accuracy:** Recognising that there is a need to understand and use words and concepts correctly, and to communicate thoughts and actions when the need arises.
- **Space and time concepts:** Understanding how things relate in size, shape and distance, how events occur in time and order, and how to use this information effectively in the learning experience.
- **Problem identification:** Experiencing a sense of imbalance and define its cause when inconsistencies occur in the learning experience.
- **Selective attention:** Choosing between relevant and irrelevant information and focusing on the information needed in the learning experience. If the learner is aware of the goal of the task, they will focus on what is relevant to achieve an outcome. Here the learner has to control thoughts and actions, and make decisions regarding relevance. It also requires the learner to disregard irrelevant information and not be distracted by it but focus on the outcome.

Again, for best results in the project example, learners have to be precise in their explanation, be selective about the appropriateness of the information used (selective attention), and be able to evaluate and monitor the learning so that the output answers the brief of the project given, confirming the learning experience. It is important that the learner is able to identify if information is not coherent so that necessary changes can be made. In addition to the building blocks of thinking, Greenberg (2000a), like Feuerstein et al. (1980) included affect as an important influence on cognitive processing and learning. She describes the strategies, which motivates behaviours and understands feelings, as “tools of learning”, and these foster independent and interdependent learning. These strategies include tools for understanding feelings within the learning experience (inner meaning, feelings of challenge, awareness of self-change and feeling of competence), and motivating behaviour within the learning.
experience (self-regulation, goal orientation, self-development and sharing behaviour) (Greenberg, 2000a, p 94-118). These “tools of learning” confirm the affective and motivational features expressed by Feuerstein et al. (1980).

**Understanding feelings within the learning experience.**

The tools, developing an awareness of the feelings involved in any learning experience, include:

- **Inner meaning:** To discover deep personal value in learning experiences that energise thinking and behaviour, and lead to greater commitment and success.
- **Feelings of challenge:** To energise learning effectively in new and complex experiences.
- **Awareness of self-change:** To recognise and understand feelings about personal growth and to learn to expect and welcome change and development.
- **Feeling of competence:** To energise feelings thoughts and behaviours by developing beliefs about being capable of learning and doing something effectively.

**Motivating behaviour within the learning experience.**

The second tool of learning, where the learner has to choose, initiate and persist in specific actions includes the following processes:

- **Self-regulation:** The learner has to reflect on thoughts and actions as they occur to energise, sustain and direct behaviour towards successful learning.
- **Goal orientation:** The learner has to take purposeful action in consistently setting, seeking and reaching personal objectives.
- **Self-development:** To value personal qualities and to enhance personal potential.
- **Sharing behaviour:** To become interdependent by sharing thoughts and actions effectively, by enhancing collaborative learning, and by participating actively as learner and peer mediator.

The learner’s attempt at the project example involves both motivation and affect. The project may seem overwhelming at first but can be broken up into smaller sections so that the feelings associated with the task do not detract from completing the project (feelings of challenge). The learner has to link past experiences, identify the inner value so that they are
motivated to stay focused (inner meaning) and through the process of sharing with either peers or teacher, develop a better understanding of what is required (sharing behaviour). This encourages a feeling of competence in the learners, motivating them further. The learner works towards a goal, regulating both behaviour and thinking (self-regulation), and accomplishes the goal set for that project.

From the example and the details on the "blocks and tools" given above, and referred to in Appendices U and V, it can be seen that learners can use this meta-strategic knowledge across all areas of learning. For the current study, however, selected metacognitive strategies (self-regulation, exploration, planning, selective attention and thought integration) as discussed above and in the method chapter were presented within the context of reading comprehension activities. Bridging or transcendence of learning, to other contexts, was also encouraged. Skuy (1996) maintains that the goal of mediating transcendence is to promote the acquisition of principles, concepts or strategies that can be generalised to learning beyond the immediate and applied to new learning in other contexts. The blocks of thinking and tools of learning, if presented void of the principles of mediation with reflection, would remain as content–based strategies. Therefore, the concept of metacognition was emphasised in this study, as reflection, evaluation and monitoring, through verbal discourse between the interventionist and the learners, as well as among the learners themselves, was fundamental to the instructional process involved. The blocks and tools selected were identified as significant without devaluing the other concepts in CEA, as limited time for the intervention with each group was available within the curriculum and classroom. These blocks and tools are explained next in further detail with specific reference to reading comprehension.

**Selected CEA block and tools utilised in the metacognitive intervention:**

The CEA blocks and tools selected are presented systematically in chapter 6. Self-regulation, exploration and planning require the learners to understand how to approach a learning experience, explore what is required in any given task, systematically search for information needed, select relevant information, and depending on the goal of the activity, to systematically organise the information gathered, follow appropriate procedures and anticipate changes so that the necessary shifts can be made. Self-regulation also promotes the learners’ reflection on thoughts and actions, to energise, sustain and direct behaviours towards successful outcomes (Greenberg, 2000a, 2005a). It helps the learners to reduce
distraction and to focus on the task at hand, responding in a regulated manner rather than impulsively. From the researcher’s experience, as a clinician in classroom intervention and interchanges, as well as from the surveys of teachers’ needs for continuing professional development, it was apparent that learners have difficulty focusing on tasks effectively, processing auditory information ineffectively due to poor attention and concentration skills, as well as being impulsive, resulting in several output errors.

Furthermore, Derry (1998) states that the instructional presentation of the teacher influences the learner’s ability to focus attention in a structured manner. Therefore, the quality of the instruction is essential in maintaining reciprocity with the learners. Strategies in self-regulation would also assist learners to stop and think, and be in control of their thinking and behaviour so that they achieve the outcomes required. Self-regulation, a “tool of learning”, assists in monitoring both thought and action, creating an awareness of self-control. Approaching a task also needs exploration and planning: exploration of the activity on hand decreases impulsive engagement of the task and creates an awareness of what is required of the activity. Kar, Dash, Das and Carlson (1993) state that planning, which is a unique human cognitive process, is central in regulating any goal-directed behaviour. This involves making decisions, judgements and evaluations, and includes the generation, selection and execution of strategies in cognitive performance. It also implies that planning, as a cognitive skill, reflects the essence of human intelligence.

In addition, the metacognitive strategies of selective attention and thought integration require the learners to focus on what is relevant information, disregarding irrelevant information based on the goal of the activity, as well as to process the information simultaneously and sequentially. According to Greenberg (2000a, 2005a), the learner has to narrow their focus from the vast amounts of information drawn from their past experiences and the materials on hand and focus on what is relevant so that their working memory can process the information effectively. This is essential as their working memory has limited capacity (Baddeley, 1996). The learner also needs to be able to make comparisons so that one piece of information is evaluated against another. The strategies of determining the goal of that activity and identifying relevant from irrelevant information in the task must be applied. This is not an automatic process for all learners. Therefore, including selective attention was essential for the learners in the present study, so that they could develop their decision-making skills while taking responsibility for their learning. Determining the purpose of the activity was achieved
through mediation and the instruction shared. Furthermore, thought integration involves simultaneous and successive processing of information (Das et al., 1994). The learner has to hold several pieces of information in working memory while processing it. Learners often do not apply this spontaneously, and may not be aware of the need to, or how to integrate the information. Merritt et al. (1998) state that learners engage in various types of discourse in class composed of related information expressed in connected units rather than isolated concepts or sentences. If the learner does not integrate the information, they may display learning behaviours which do not promote comprehension (Wallach & Butler, 1994). Making learners alert to thought integration was important in this study so that they could develop effective comprehension of information by holding several pieces of relevant information, simultaneously and sequentially, while processing it.

5.8 Meta-Strategic Knowledge and Reading

The CEA blocks and tools selected are deemed important for effective reading comprehension as self-regulation, exploration, planning, selective attention and thought integration influence cognitive processing general to learning. As a result of the reported low literacy levels in South African schools, learners face particular challenges of comprehending narrative and expository texts especially in the intermediate phase of education. It is thus important that the learner acquires effective self-regulation to focus on the reading task so that the content can be explored, alerting them to what is expected of them. The learner needs to retrieve information from their schemas, which were developed previously to organise concepts and to aid in understanding of new information. This requires selective attention and comparative skills so that a mental representation of the concept is developed. Schema building, in addition to assisting comprehension, also aids memory through organisation and elaboration of ideas (Meade & Cubey, 2008). It encourages in-depth analysis and is particularly useful when the instruction is ambiguous (Derry, 1998). The learner then has to use thought integration by processing the text simultaneously and sequentially to achieve the desired result. According to Cain et al. (2006), generation of the incorrect inference is an indication that the reader is poor at selecting the relevant information from the text and from their knowledge base.
These metacognitive skills promote comprehension, involving the learner in an active process of constructing a representation of the text (Merritt et al., 1998). Moreover, self-regulation assists the learner at the input phase, while exploration, planning, selective attention and thought integration assist at the elaboration phase of cognitive processing to achieve the best outcome, which is comprehension of the text in the case of this study, and academic success overall. Feuerstein et al. (1980) maintain that breakdown in processing at the elaboration phase has more serious implications for the learner’s performance than if difficulties are experienced at the input and output phases. Therefore meta-strategic knowledge of exploration, planning, selective attention and thought integration is hypothesised to be crucial for improved learning outcomes.

**CEA and Reading Comprehension Text:**

Narrative text genre was used as the reading comprehension activities in the intervention as it has higher levels of cohesion than expository text (McNamara et al., 2004). This type of text is presumed to be more established, and the learners in Grade 6 would have had more experience with narratives than they would have had with expository text, which supports the use of narrative text in the present study. Furthermore, the narrative text contained themes that linked to the classroom curriculum and were central to the learners understanding the emotions of characters, events and consequences. Naremore et al. (1995) state that narrative text genres are useful in classroom learning when applied in a collaborative intervention approach. This fits in well with the cognitive enrichment advantage (CEA) programme in this study as it encouraged collaborative or shared contexts. The choice of narrative texts was important as the new metacognitive strategies introduced as part of the intervention were applied to text genres that were more familiar, and would therefore be less likely to compound the outcomes. Additionally, the aim of the study was to focus on the process, which can be transferred to other learning and material, rather than on the content. Focus on the process in instruction is beneficial, and this was also evident in the studies reviewed by Gajria et al. (2007) as process rather than content is generalised to wider learning contexts.

The comprehension passages used were recommended by the experienced teacher in the pilot study, and confirmed by the class teacher, who stated that the narrative passages selected consolidated the activities set for the curriculum. These reading passages were used in the second lesson in the intervention so that the “blocks of thinking and tools of learning” discussed in the first intervention session were bridged with understanding. This method of
linking the metacognitive strategy with learning content is believed to be important, as it allows the learner to make the necessary transfer easier to that subject area, and Glaser and Brunstein (2007) confirm this, indicating that it promotes better outcomes.

5.9 Summary of Metacognitive Instruction and Learning

Metacognitive instruction has been reported as influencing the fields of cognitive psychology and education. Metacognition is, however, a difficult concept to describe and to assess in real terms as it reflects thinking which is a dynamic process. The lack of a precise definition is probably one of the reasons why there is such a dearth of evidence-based studies available internationally and, more so, locally. Both cognitive and metacognitive terms are mentioned, and they are indicated as necessary in teaching and learning. The distinction between cognition and metacognition, however, lies in how the information is used (Flavell, 1977; van der Walt & Maree, 2007). As indicated for the purpose of this study, metacognition as a concept is used since the reflection on thinking is pivotal in the intervention. Metacognition, therefore in the current study, refers to reflection, evaluation and monitoring of thinking. Cognitive skills are nevertheless also involved in this intervention process but are not focused on explicitly. The learners through verbal discourse with the interventionist as well as with their class-mates reflect on their thinking, while learning. The interventionist enquired and encouraged the learners to share their thoughts, to explain (evaluate) how and why they thought about something in a particular manner. This allowed for clarification (monitoring) of thinking, as well as stimulated further discussion among the learners. By engaging the learners in the process of thinking, modelling thinking and bridging or applying the strategies to other learning situations, the process of thinking as an important outcome was promoted, which in addition to the content learnt, was essential. The studies which examined metacognitive instruction and its impact on learning, suggested that more explicit focus on the process and not only on the content is necessary for effective outcomes. Metacognitive instruction has implications for use with individuals with poor academic performance, children from lower socio-economic status groups, clinical psychotherapy and individuals with traumatic brain injury, to name a few. Haywood (1997) adds that cognitive instruction should be part of all learning contexts, as spontaneous learning may be insufficient for some learners. The present study therefore applied the metacognitive intervention in a mainstream public school context.
Several cognitive and metacognitive instructional approaches are discussed in the studies examined, and domain-specific versus domain-general applications, are indicated. Linking strategies with specific learning areas rather than teaching strategies in isolation are also suggested so that the learning is relevant and meaningful for the individual (Glaser & Brunstein, 2007). Additionally, the concept of ATI was considered and many studies presented instruction based on the profiles of the individual’s cognitive processing on the CAS where learners were found to improve in their areas of cognitive weakness when instruction was specifically related to those areas. Furthermore, a variety of cognitive strategies including self-talk or “talk-alouds” were indicated, where the learners verbalised their thinking, making what may be implicit knowledge, explicit (Hay, 2000). The process of sharing assists in developing meaning, which is fundamental in reading. From the studies reviewed, different methodologies and limitations were evident and therefore direct comparisons may not be possible although there are underlying philosophies of mediation, cognitive processing and structural cognitive modifiability. Effectual and ineffectual application of metacognitive instruction was also mentioned and may be as a result of numerous factors, including a less than adequate metacognitive knowledge base, limited language competency, classroom instruction, absence of linking strategy to learning content, absence of bridging, poor resource allocation and ineffective cognitive processing. These factors were considered in the intervention phase of this study.

The CEA programme based on Vygotsky and Feuerstein’s’ theoretical principles was adopted and selected “blocks of thinking and tools of learning”, including self-regulation, exploration, planning, selective attention and thought integration were presented. The interventionist introduced the metacognitive strategies of the CEA programme, and bridged these firstly to reading and then to other contexts. Learners were encouraged throughout the intervention process to reflect on their thinking and to bridge their metacognitive strategies to other learning contexts. The concept of verbalisation was emphasised and promoted, based on Vygotsky’s perspective that learning occurs on two levels, interpersonally through social collaboration and then intrapersonally, when the learning is internalised.

From the literature reviewed, metacognitive instruction has a place in education. This has positive implications for South Africa, as it affords an opportunity to develop independent and interdependent learners, specifically in literacy as well as motivating their interactive participation in classroom learning. Additionally, the cognitive and learning theories
discussed underpin this study’s intervention paradigm and is central to contemporary educational pedagogy. Hence this study examined the effects of metacognitive instruction on reading comprehension. The next chapter on methods describes in addition to the research process, the content and process of the intervention applied.
6.1 Introduction

This chapter presents the study’s purpose, its rationale and the research method selected in response to the research questions. As indicated by Johnson and Onwuegbuzie (2004) in the quote above, in the mixed methods design a method and a philosophy are applied that attempt to bring together two major research paradigms (quantitative and qualitative) to provide insights and to offer the best opportunity to answer the research questions. The purpose and the rationale for using a mixed methods research approach are explained below. In addition, the participants and the materials used in the study are described, as well as the procedures applied; and these are discussed in accordance with the ethical procedures required. Furthermore, strengths and limitations of the design, reliability and legitimation (e.g. validity, trustworthiness, credibility, dependability, confirmability and transferability) issues are considered (Onwuegbuzie & Teddlie, 2003). The content and process of the metacognitive intervention paradigm applied in the study are also described.

6.2 Research Questions

The main research question was whether there would be differences in reading comprehension between the experimental and the control schools, following a metacognitive intervention for the experimental groups.

The following sub-research questions were also examined:
(1) Are there differences between the experimental and the control school on the JET standardised reading evaluation, following a metacognitive intervention, at pre-, mid- and post-testing?
(2) Are there differences in cognitive functioning on the cognitive assessment system (CAS) between the experimental and the control schools, following a metacognitive intervention at pre-, mid- and post-testing?

(3) Are there differences between the experimental group 1 (Exp G1) and experimental group 2 (Exp G2), on the JET standardised reading evaluation, the school’s continuous assessment profiles and the cognitive assessment system (CAS) at pre-, mid- and post-intervention?

(4) Is there a difference between low and high performers on the JET reading and the CAS in the experimental and control schools?

(5) Are there significant correlations between the CAS and the JET reading tests?

(6) What are the perceptions of the learners, their parents and their teacher of the metacognitive intervention in the experimental school?

6.3 **Rationale for the Study**

According to Gajria et al. (2007), effective “metacognition”, which refers to the reflection on the thinking process, is necessary for learning and academic success. For learners to achieve academic success, reading is fundamental therefore the low literacy levels reported in South African school provide a context in which metacognition can potentially support learning. Hay (2000) maintains that thinking and learning can improve with explicit instruction. The explicit instruction to develop metacognition is reflective of the mediational strategies that a more knowledgeable person brings to the interaction with the child (learner) within a social context (Vygotsky, 1978).

Metacognitive instruction requires a high level of cognitive processing, where the learners reflect on the strategies applied to a task, allowing them to monitor, evaluate and direct their own learning within a social paradigm. This may allow learners to apply and transfer strategies effectively when approaching novel tasks, making them independent as well as interdependent learners, where they should be able to learn from their peers through social interaction. Published research studies using metacognitive approaches and academic subjects have indicated improved outcomes and these were discussed in previous chapters (Berger et al., 2008; Conway & Hopton, 2000). According to Haddad et al. (2003), learners in their study were able to engage in abstract thinking when introduced to metacognitive strategies at the appropriate cognitive developmental level, resulting in improved reading comprehension.
A learner's response to instruction is related to his or her cognitive characteristics, and as cognitive processing abilities are not accurately represented by traditional intelligence quotient (IQ) measures (Naglieri, 1989), cognitive processing required for learning and assessed by the CAS was included in this study.

Several studies on metacognitive instruction and strategies, as well as content augmentation have been carried out, and improved performance has been evident in mathematics, reading comprehension and problem-solving tasks (Cormier et al., 1990; Gajria et al., 2007; Haddad, et al., 2003; Naglieri & Johnson, 2000). These studies were discussed in detail in the previous chapter. While there are many South African studies on methods of teaching, no studies indicating an application of metacognitive strategies to enhance scholastic performance are evident. In fact, there is a paucity of published theoretical and empirical research in the areas of cognition, reading comprehension and instruction in South Africa. Metacognitive instruction in this study is process-orientated and is hypothesised to have an influence on learning, which would be beneficial for all learners, irrespective of home language. This is important as South African schools are diverse, with the majority of schools having English first and English-additional-language (EAL) learners. Vygotsky (1978) indicated that instruction is at the heart of learning, and it is essential for effective learning and development. Therefore, instruction within the classroom needs to be examined before literacy and learning levels can improve in South African schools. This study thus focused on metacognitive instruction, where the learners reflected on their application of metacognitive learning strategies, and how these strategies related to their cognitive processing and reading comprehension skills within a classroom context.

6.4 Hypotheses

Based on this rationale and the research questions, the following hypotheses were explored in this study:

Hypothesis 1: There will be no significant differences between the experimental and control schools, as well as between Exp G1 and Exp G2 at pre-test on their reading comprehension abilities.
Hypothesis 2: Following the intervention, however, there will be a statistically significant
difference in reading comprehension between the experimental school and the control school,
as well as between Exp G1 and Exp G2, with Exp G1 performing significantly better than
Exp G2 in their reading performance on the Jet standardised reading evaluation, as well as in
their continuous assessment class profiles.

Hypothesis 3: The experimental school will perform significantly better than the control
school in their cognitive processing on the CAS evaluations, post-intervention.

Hypothesis 4: Statistically significant correlations will be found between the reading
comprehension and cognitive processing on the CAS test for the learners in the experimental
school.

Hypothesis 5: Learners who have low scores on the JET reading test and low scores on
cognitive processing subtests of the CAS will show statistically significant changes in
performance following the intervention.

Hypothesis 6: A positive change in awareness and perception will be found among learners,
regarding metacognitive strategies from pre- to post-intervention. This will be supported by
parents and the teacher, in the experimental school, who will also be able to comment on
positive changes in the learners’ approach to their learning.

6.5 Research Design

The research design is expressed in terms of the research methods selected to address the
study, taking into account reliability and legitimacy factors. A cross-over design was
selected, as it involved an intervention paradigm. It may also be referred to as a “cross-
lagged” design and can be used with within-subject designs (Rosnow & Rosenthal, 2002).
The sample in this study can also be described as “crossed” because of the treatment
conditions, where one group (Exp G1) received the intervention in the first half of the year,
and the other group (Exp G2) received the intervention in the second half of the year. This
design is relevant, as the treatment for the second group is delayed so that comparisons can
be drawn between group one and two in the experimental school, and the effects of the intervention can thus be observed and described.

A mixed methods approach was selected since both quantitative and qualitative data were collected within a single study, providing method triangulation, which increases the legitimacy of this study (Tashakkori & Teddlie, 2003). A mixed methods approach includes a pragmatic philosophical assumption, strategies of inquiry and specific methods that answer the research questions based on the collection, analysis and interpretation of both qualitative and quantitative data (Creswell, 2009; Creswell & Plano Clark, 2007). According to Bryman (2006, 2007), mixed methods also implies that the different data sources are significant in terms of the research outcomes, and thus unexpected insights may arise. This approach is appropriate in this study, as the underlying philosophy for the metacognitive intervention is based on a current need in education for improved instruction in developing reading performance in South African children. Furthermore, the mixed methods design was selected based on its theoretical premise of “triangulation, which refers to multi-methods (quantitative and qualitative), multi-sources (several data sources) to interpret the phenomena; complementarity, which refers to elaboration and clarification of the results from one method with that of the other, increasing interpretation and credibility of the findings; and expansion, which extends the scope and range of inquiry using different methods for different aspects of the same phenomena being studied” [italics added] (Greene, Caracelli & Graham, 1989, p. 259).

The data collection and analyses involved a concurrent embedded strategy, where “concurrent” indicates that the quantitative and qualitative data were collected simultaneously for the experimental school at each measurement time. The quantitative method was primary with the qualitative method providing a major supporting role in the process in this study; the mixing process is referred to as “embedding”, hence the strategy of concurrent embedding was applied (Creswell & Zhang, 2009). The typology of concurrent embedding legitimates mixed methods as a distinctive research paradigm (Johnson & Onwuegbuzie, 2004). This is depicted in concepts (Creswell, 2009) outlined in Figure 6.1 below.
Timing  No sequence  
Data collected concurrently at each time

Weighting  Equal weighting of both data processes

Mixing  Integrating and embedding of the data

Theorising  Explicit theoretical framework

Figure 6.1 Process of Mixed Methods Approach

The process followed in the study is indicated in Figure 6.1, where both quantitative and qualitative processes occur in tandem, and this is important in an intervention paradigm as the overall strength of a study is greater than either process on its own (Creswell, 2009). The approach can be depicted in a design notation as QUAN+qual, with both methods of data collection complimenting each other, providing valuable information for the study’s research questions and the interpretations of the findings.

The stage of mixing or integration is central in a mixed methods research design. Although this study used concurrent embedding at the data collection and analyses phases, integration was applied in the interpretation phase (chapter 8 - discussion). This was based on the fact that by integrating the different perspectives from the different methods, interesting contrasts might be highlighted or clarification might occur, which would provide a wider view and insight, forming a coherent whole (Bryman, 2007; Onwuegbuzie & Teddlie, 2003; Tashakkorri & Teddlie, 2003).

The advantage of a mixed methods approach is that the biases of one method can neutralise the biases of the other, and it affords a broader perspective from the different data collected (Creswell & Zhang, 2009; Johnson & Onwuegbuzie, 2004). It also presents insight from both approaches, combining it into a workable solution, that is, an understanding of the learners’ performance and perceptions of metacognition, based on the quantitative and qualitative data. Onwuegbuzie and Teddlie (2003) add that a mixed methods approach provides the opportunity to gain more out of the data, thus generating more meaning, and thereby influencing the quality of the interpretation. Furthermore, they indicate that this approach offers “descriptive precision and numerical precision within the same interpretation, boosting
legitimacy" (p. 361). Conclusions can be drawn and new theory can be articulated from convergent and divergent findings in this process (Erzberger & Kelle, 2003).

A limitation, however, may be in the manner in which the data is integrated into the analyses, and as the two methods may not be completely equal in priority, any unequal evidence may be a disadvantage when interpreting the data (Creswell, 2009). Integration or mixing of the data, as indicated, occurs in the discussion chapter of this study, as the key issues identified are better understood when both methods are applied. Bryman (2007) states, however, that the extent of the integration may be restricted to some degree, as insufficient exemplars are available for best practice models. Further limitations may include time, cost and complexity of process (Johnson & Onwuegbuzie, 2004). As the mixed methods approach is emerging as a third research method, there are some concerns regarding paradigm mixing, analyses and interpretation (Teddlie & Tashakkori, 2003). The quantitative and qualitative components of the mixed methods approach used in this study are described next.

6.5.1 Quantitative research method

A quasi-experimental design was used as no true control group or randomization of participants was involved. The sampling procedure was convenient and non-probable, as naturally-formed class groups within the schools were selected (Creswell, 2009). The study also resembled an experimental design in some respects, including an experimental and a non-equivalent control group (Tredoux & Smith, 2007). A non-equivalent control group (NECG) was included, as matching pairs of participants was not possible in this context. The learners nevertheless, were within the same age range, grade and school district, and they were exposed to the same curriculum requirements. In addition, pre- and post-testing of both groups was conducted. The pre-test provided the baseline functioning of all participants before the commencement of the intervention in order to statistically control for the fact that the two groups might not be comparable or equivalent on certain measures (Fife-Schaw, 2003). Limitations of this design may include selection bias, maturation factors and history (Schiavetti & Metz, 2002; Tredoux & Smith, 2007).

An attempt to control for these factors was considered. The entire class of Grade six learners was involved as a group, as it would be unethical to select specific individuals when intervention programmes linked to their academic curriculum are involved. Thus, the
inclusion of an entire class in the intervention counters against selection bias, increasing the validity of the study. In a longitudinal study, maturation may influence results (Schiavetti & Metz, 2002). This was considered by using a repeated measure design (pre-, mid- and post-testing), and which allowed the learners to serve as their own comparison. Although all participants were in the same grade, they possessed individual differences with respect to aptitude, skills and motivation. Nevertheless, using a control school with learners of the same age and grade was also an attempt to control for differences due to maturation. The third effect of history, where the teacher, parent, peers or significant others may influence the outcomes by the very nature of their interaction with the participants over the research period, was overcome by the cross-over design utilized in the experimental school (Fife-Schaw, 2003).

A mixed-subject, within-groups and between-groups design was used (Schiavetti & Metz, 2002). In the experimental school, both a within- and between-groups research design was used, where each group (Exp G1 and Exp G2) was compared to itself and then the groups were compared to each other at pre-, mid- and post-testing. Additionally, between-group design was used, where the control school and the experimental school were compared at the three measurement times.

One of the advantages of the quantitative approach is that it provides numerical data which allows for quantitative predictions to be made. The results are independent of the researcher as objective statistical methods are used. One limitation is that it may not provide all information needed to understand the phenomena being studied, as in the case of this study, since it may not reflect the thinking processes of the learners. A quantitative approach tests rather than builds theory. Quantitative methods are best for larger samples but can be used with smaller samples, provided the sample size is sufficient for statistical analyses.

6.5.2 Qualitative research method
A qualitative research method was included in this study, as an attempt at method triangulation, where multiple methods from qualitative and quantitative (mixed methods approach) sources were analysed to provide convergent evidence, which increases the validity of the study (Kelly, 2007; Neuman, 2006; Patton, 2001). Qualitative methods, compared to quantitative methods, present different philosophical assumptions in terms of data collection, context, analysis and interpretation. Furthermore, qualitative approaches
focus on the phenomenon that occurs in a natural context and examine the data in all its complexities (Leedy & Ormrod, 2005). Qualitative research uses an inductive approach, which is described by Miles and Huberman (1994) as being “well grounded, rich in description and explanation of processes in identifiable local contexts” (p. 1). In addition, Neuman (2006) states: “Explanation of the data, in this method, is rich in detail, sensitive to context and is capable of showing the complex processes or sequences of social life” (p. 459). The social context in this approach is therefore fundamental, and the sequence of events and the time must be considered when analysing and interpreting the information.

The qualitative data in this study was collected at the school by interviewing the learners and the teacher, and analysing the responses of the parent questionnaires. Multiple types of data were collected by means of multiple methods including questionnaires, interviews, focus groups and sentence completion activities. This triangulation of sources adds to the credibility of the study (Patton, 2001). Inductive data analysis and interpretative inquiry were used to identify the patterns and themes, and this is discussed further, under the qualitative data analyses section in the latter portion of this chapter. According to Creswell (2009), an interpretative inquiry maintains both the participant’s perspective of issues and the researcher’s interpretation so that a more holistic view is achieved. Moreover, the main approach used to analyse the qualitative data in this study was thematic content analyses, as it may reveal messages in the text that are difficult to observe directly (Neuman, 2006). This is expanded on in the section on data analyses, later in this chapter.

The strengths of a qualitative method are that it focuses on naturally occurring phenomenon, depicting detailed real-life experiences of the learners, teachers and parents in this study. The data is therefore grounded in natural contexts involving temporal sequence and processes. Qualitative data provide the experiences of the individuals, reflecting how they interpret, perceive, assume and judge the phenomenon in the study, giving meaning to their social world (Miles & Huberman, 1994). This approach therefore adds value to the quantitative method discussed earlier. The advantages of the qualitative method include that any sample size can be studied; it describes complex phenomenon, and provides information in a natural context; it provides individual case information and can be used to conduct cross-case comparison analyses. The limitations are that it is difficult to make qualitative predictions, the research may be context-bound, time-consuming, and the interpretation of results may be
influenced by the researcher’s bias. The data is considered subjective because it is reported by the individual (Johnson & Onwuegbuzie, 2004).

6.5.3 Reliability and legitimation factors

Reliability

Reliability of the measures used in the study is discussed in the section on data analyses (results chapter). Reliability regarding the study procedure was also considered, as replicability is implicated (Schiavetti & Metz, 2002; Van der Riet & Durrheim, 2007).

A mixed methods research design with non-equivalent control groups was used for the purpose of triangulation, complementarity and expansion, as it provides representation, and a wider perspective on analysis and interpretation of the data (Greene et al., 1989). Feuerstein’s theory underlying the intervention phase is reported extensively in the literature internationally and to a lesser extent, locally. In addition, the primary interventionist was a trained speech and language therapist, who presented the metacognitive intervention to reduce experimental bias. Furthermore, the CEA programme has reported reliability and validity (Greenberg, 2000a, 2005a). The field assistants were professionals trained in psychometrics.

A selection of reading comprehension passages was obtained from the DoE and private, mainstream schools to determine the appropriateness of the reading comprehension passages that were used to assess Grade six reading comprehension abilities in the classroom. Two Grade six teachers, from two schools, not included in this study, with a minimum of five years’ teaching experience in that grade, and were invited to independently rate the material in terms of its suitability for Grade six learners. This was to ensure that agreement from experienced teachers in the intermediate phase was obtained to strengthen the design, increasing inter-rater reliability. The teacher graded the material according to reading- levels, linguistic content, time factor and complexity of the narrative text structure, as well as whether literal and inferential questions were included in the task (refer to Appendix B for the rating criteria). This teacher, based on her knowledge and experience, gave invaluable feedback. She prioritised the passages according to their relevance and suitability for Grade six, and commented that many of the passages selected were from “Comprehensive Practice
for English Grade 6” by Goodacre, Ansur and Howell (1993), which is suggested as an appropriate text for this grade.

**Internal and external validity factors**
The following threats to internal and external validity were considered:

The research design controlled for maturation and history factors as repeated measures were obtained. Test-practice effects may be evident as the participants’ results may reflect improvement by the very nature of repeated measurements. However, feedback to learners regarding their performance was minimized to reduce influencing outcomes. Even though alternate forms could not be used, a minimum of five months was maintained between the repeat measurements. Test-retest reliability requires a month or more, and the five months in the current study was therefore considered sufficient (Hammond, 2003). Equivalence of ability at baseline was important so that changes at mid-year and final testing could be tracked, thereby counteracting the threat of regression to the mean (Bordens & Abbot, 1991).

The intervention process would have been influenced by the dynamics of the group as thinking is dynamic, but the content of the programme was consistent. The Hawthorne Effect may influence results as learners received an intervention that was somewhat different to their everyday teaching. This was minimised by the absence of discussion regarding their performance on the standardised measures, during the intervention. The sample size may not be sufficiently large to allow for generalisability or transferability to other school contexts. However, the sample size is representative of the grade level selected within the DoE schools. The process of randomisation was absent when creating the groups, as the class groups were naturally formed, but ecological validity was ensured by locating the intervention within the school setting.

**Process of legitimisation**
Onwuegbuzie and Teddlie (2003) indicate that legitimisation can be assessed by applying one or more of the following validity or credibility factors: prolonged engagement with the data, triangulation of methods and data sources, an audit trail, monitoring researcher bias, contrasting and comparing data, examining negative cases, and including rich and thick descriptions, were included.
6.6 Participants

6.6.1 Sampling method
A non-probability convenient sampling method was used, as naturally-formed class groups within the school were available (Durrheim & Painter, 2007). For the qualitative data, four boys and four girls were conveniently placed into focus groups, over the different measurement times. One teacher and 15 parents were included, following the same convenient sampling procedure.

6.6.2 Selection criteria for inclusion
Participants were selected as a class group rather than on their scholastic performance. This is important for two reasons. The first being that, ethically, intervention cannot be given to some within a group while others are omitted and, secondly, choice of participants with extreme scores for intervention studies may produce regression effects, which is a threat to internal validity. Post-intervention results may reveal improvements but this may merely reflect extreme scores, which after the intervention may have become less extreme (Schiavetti & Metz, 2002). All learners at the experimental school were included in the intervention as parental consent was obtained.

All the learners, from both experimental and control schools, had a minimum of four years of primary school exposure to English, which is the language of learning and teaching (LoLT), and therefore be able to understand the testing and the intervention instruction. A test of language skills, namely the Clinical Evaluation of Language Fundamentals (CELF 3- 3rd Ed) (Semel, Wiig & Secord, 1995) was also administered to provide a level of baseline performance in terms of English proficiency. In addition, scholastic ability of the learners was reported as satisfactory, and this was indicated in their school records. School progress was further indicated in the biographical questionnaires completed by the teachers and parents. This was to decrease any confounding effects of low ability on the results.

6.6.3 Background of the schools in the study
The schools, referred to as the experimental and control schools, are both from the same educational region, comparable in its location and constitution. From the school’s location, fee structure and the teacher’s report, the majority of the learners were likely to be from
middle- to high-income families. This is supported by the schools being located within largely middle-class communities. Based on the socio-economic levels of families attending a school, the DoE allocates a poverty index, and these schools were allocated a DoE Poverty Index of 5, which indicates the highest income range (DoE- create, 2009). In the previous educational dispensation, these schools were referred to as Model C schools, which meant that the schools were in urban areas, had reported better resources, with teacher-learner ratios of approximately 25 to 30 learners per class and usually had English as the medium of instruction. Both the experimental and control schools are primary level, co-education schools, with English First Language (EFL) and English Additional language (EAL) learners, in attendance.

6.6.3.1 Experimental school
The experimental school was founded in 1917 and as learner registration increased in 1932, it split into junior and senior schools, upholding the same philosophy for education. The current, senior co-educational school has 366 learners, with 193 females and 173 males, and a compliment of approximately 20 staff. It provides education for grades four to seven in any academic year. This school has a philosophy of developing well-balanced learners who progress to high school environments with little need for adjustments. The school is proud of a team of dedicated staff who are highly motivated, with “one goal in mind” - the education of future leaders of the country and beyond. Teamwork is stressed as well as individual motivation, discipline and fun. Progressive educational views are evident. Competitive sports are part of the programme, and good sportsmanship is encouraged (School website, 2009; teachers, personal communication, 2010).

The school also upholds a holistic view of development of its learners. Teaching includes experiential visits to sites so that learning is not only classroom-based. For example, projects related to the Zoo Lake, a site close to the school and a well visited spot by the communities, would involve all grades such that grade fours would look at the history, with grade fives researching the bird life; grade six would examine the biodiversity and grade seven would explore the environmental issues. This indicates that the school’s approach to learning at different levels is developmental and the topics are linked, allowing learners’ contributions to add value to the experiences. Moreover, the school encourages social responsibility by encouraging learners to be involved in contributing to communities in need both locally and internationally. This school also benchmarks itself against other schools in terms of academic
achievements so that the best programmes can be afforded to its learners (U. Bahadur, personal communication, July 2010). The school currently has three classes of grade six learners with approximately 90 learners. For the purpose of this study, a sample of two of the three Grade six classes formed the experimental groups consisting of 59 learners. The third class, although not part of the study, was provided with the intervention, for ethical reasons.

6.6.3.2 Control school
The control school promotes a philosophy of “providing an environment that gives a child happy memories” of their primary school years. The school is committed to the development of an educational environment in which the intellectual, creative, emotional and social, spiritual and physical capabilities of each child will flourish, thereby providing a solid foundation for secondary education and self-fulfilment. Teamwork between school, home and the learner is stressed by the principal of the school (School website, 2009).

The school opened in 1953, with 480 learners registered in that year. Currently, the school has 523 learners, with 280 females and 243 males, and a compliment of 32 staff. Grade R to Grade seven are included. Grade six consisted of two classes with approximately 58 learners who were available for the study. The learners, whose parents provided consent for their participation in the study, formed the control group consisting of 50 learners, at the commencement of the study.

6.6.4 Description of the participants
There were two groups of participants, with a total of 59 learners, in the experimental school and 58 learners in the control school, from the intermediate phase, Grade six, mainstream education in Gauteng. The participants are referred to as learners as this is appropriate within the context of this study. The number of learners assessed on the CAS and JET reading tests are indicated in Table 6.1.

One hundred-and-twenty learners were initially expected as generally 30 learners were assumed to be in each class. However, following class allocation, the experimental school had 59 learners and the control school had 58 learners. Further to parent consent, learner assent and learners who did not complete all measures across the three testing times, a total of 44 learners in the experimental school and 39 in the control school completed the CAS and JET measures, forming the final sample of 83. Although there was an attrition of 37 learners,
a final sample with 42 males and 41 females formed the composite group for the study. Inclusion of both genders is reflective of the co-educational government schools in South Africa and this provides a wider context for interpreting the results.

Table 6.1: Sample Demographics for the Experimental and Control Schools

<table>
<thead>
<tr>
<th>School</th>
<th>Tests</th>
<th>Gender</th>
<th>Age Range</th>
<th>Mean Age</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAS</td>
<td>JET Reading</td>
<td>males females</td>
<td>11 12 13 14</td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>44</td>
<td>44</td>
<td>22</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Control</td>
<td>39</td>
<td>39</td>
<td>20</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>83</td>
<td>83</td>
<td>42</td>
<td>41</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: Experimental: n=44; Control: n=39

The learners from the control school formed the comparison group. In this school, grade, age range, gender, educational district and socio-economic status (SES) were equated to the learners in the experimental school. Exact matching was not possible as the grade as a whole was selected. However, since the above factors could introduce confounding variables, information from parent and/or teacher questionnaire was obtained to reduce these variables. Three groups were ultimately formed, where two classes in the experimental school were randomly allocated to either Exp G1 or Exp G2. This was necessary as the cross-over design required that one group (Exp G1) receive the intervention in the first semester and the other group (Exp G2) receive it in the second semester. The learners in the control school were considered as a single group, as no intervention was provided and no comparison within that group was required.

Grade six learners (generally, aged between 11 and 12 years) were selected as an appropriate level to present the intervention. Table 6.1 indicates the ages of learners according to their respective schools. From the age distribution, it can be seen that most of the learners were in the 11- to 12-year range, with a mean age of 12.11 at the experimental school and 11.85 at the control school. This age range and grade were selected as metacognitive ability is evident at ages 11-12 years, and such learners, according to Piaget, should be capable of engaging in the formal operational thinking required for learning in schools (Witt, 1998). Metacognitive
instruction, which requires abstraction of thought, is believed to be effective in intermediate phase learners, as they should be able to reflect on language in a decontextualised manner. Furthermore, they should also be able to use their metalinguistic skills to verbalise their thoughts (Merritt et al., 1998). The school curriculum requirements for this grade focus on content areas, with the learner recalling past learning and applying knowledge and skill to all academic subjects (Owens, 1999). Grade six was therefore seen as suitable for the study as the higher-order comprehension skills required in reading comprehension activities should be more accessible to these learners. These skills should allow the learners to engage with the text, understand and apply their metacognitive knowledge and strategies (Westby, 1998).

Home language distribution as indicated on the JET reading evaluation from both experimental and control schools revealed that 25% of the learners spoke languages other than just English within their homes. These included IsiXhosa, IsiZulu, Sesotho, Setswana, Tshivenda, German, Portuguese and Afrikaans. Furthermore, the learners could not be categorised into English first language (EFL) and English additional language (EAL) specifically, as these learners have had English as their medium of instruction for several years and they considered English as their home language, in addition to any other language spoken (Learners, personal communication, January 2008). Approximately 80% of the learners were monolingual, with English as their home language. Socio-economic status was measured in the questionnaire but was often omitted when the biographical questionnaire was completed. However, as indicated earlier, the majority of the learners were from middle class socio-economic groups. This is important as the expectations of parents of these learners can be assumed to be high regarding literacy, and home environments may be more encouraging of literacy skills. The control school in particular was reported to have a high percentage of parents who are academics (School report, 2008). The learners in this study can therefore be depicted as more of a culturally different group rather than culturally deprived, terms described by Feuerstein et al. (1980), and elaborated on in the literature review. In this study the learners are described as “culturally different” as they have had the opportunity to attend schools in urban areas, live with nuclear families and are diverse in their home languages to the medium of instruction of the school. This is an important factor as Feuerstein et al. (1980) stated that “culturally different” children are more accessible to modification than “culturally deprived” or disadvantaged children. Schools such as the two used in this study are representative of the majority of urban schools in South Africa since 1994, where diversity among learners is the norm (South African School’s Act 84, 1996).
6.6.5 Selection criteria for exclusion

Learners, as indicated in the school records, who presented with peripheral visual or hearing difficulties, diagnosed dyslexia and or cognitive delay, were not included in the data analyses. Moreover, the learners whose parents or guardians did not consent to their participation in the study, learners who entered or left the grade before the programme was completed or were absent from any assessments, were omitted from the final analysis.

6.6.6 Attrition of participants

As indicated in Table 6.1, learners were excluded from the analysis if they did not have assessments in both standardised tests (CAS and JET reading) over the three periods as a result of being absent on the day the tests were conducted or having left the school before completion of the study. Attrition of participants can be a threat to internal validity. The sample size, however, needs to be considered in relation to the purpose, nature of the research design and the variability of the data (Schiavetti & Metz, 2002). In the current study, learners were from naturally formed class groups and the sample size was representative of such contexts, and the sample size seemed adequate to meet the purpose of the study, which examined the intervention within a class context.

From the expected 117 learners (experimental school = 59 + control school = 58), eight parents from the control school did not provide consent, resulting in a sample of 109 learners. The final sample was 83 (experimental school = 44 + control school = 39), as 11 learners at the control school and 15 learners at the experimental school did not comply with all the test requirements due to absence. This may have influenced the assessment outcomes but not the intervention process. The decreased sample size may be a limitation, but for an intervention study within a school context, the sample size was representative of naturally formed class groups within that school context, and the sample size had sufficient power in order for the statistical analysis to be conducted.

6.7 Measures

Both quantitative and qualitative data was captured in this study. A description of the measures and their implications for internal reliability and validity are considered below.
Additionally, instructions utilised when assessing and experimenter bias were taken into account.

### 6.7.1 Quantitative measures

#### 6.7.1.1 Cognitive Assessment System (CAS) (Naglieri & Das, 1997a)

The CAS, described by Naglieri and Das (1997a), is designed for children and adolescents, aged 5 through to 17 years. There are two forms of the test, the basic and the standard battery. The basic battery comprises eight subtests and the standard battery, which was used in this study, comprises 12 subtests. The 12 subtests are organised into four scales that represent the PASS (planning, attention, simultaneous and successive processes) theory of psychological processing. These cognitive processes are discussed in the literature review chapters.

The PASS scale scores and a total score or Full Scale (FS) are expressed as standard scores (SD), (i.e. Mean = 100, and Standard Deviation = 15). The FS score is an overall measure of cognitive processes based on a combination of the 12 subtests from the four PASS scales. The PASS scale scores are computed on the basis of the sum of subtest scale scores included in each scale. These scales represent a child’s cognitive processing in specific areas and are used to examine cognitive strengths and/or limitations (Naglieri, 2004). Each subtest measures a specific PASS process corresponding to the scale on which it is found and represents one of the four types of processes. The subtests are described in terms of their development, content, administration and scoring.

The CAS’s standardisation, reliability and validity have been widely described in the handbooks (Naglieri & Das, 1997b). The CAS was standardised on a United States population, considering variables of age, gender, race, geographical region, parent educational attainment, community setting, and disability (Naglieri & Das, 1997b). A total of 3072 children aged 5 to 17, from both regular and special education settings were used as the standardisation sample. Two thousand two hundred children formed the normative sample and the remaining 872 children were included in the reliability and validity studies. Internal consistency reliabilities and test–retest reliability coefficients are reported for the CAS Full scale, PASS scales and subtests. Subtest reliability coefficients were calculated by the split-half method for all simultaneous and successive subtests. Test-retest reliability was computed for the planning and the attention subtests as they are timed tests. Average reliability
coefficients across the standardised age group were calculated using the Fisher's z transformation (Naglieri & Das, 1997b). The full scale reliability coefficient ranged from .95 to .97. The average reliabilities for the standard battery PASS scales are Planning (.88), Attention (.88), Simultaneous (.93), and Successive (.93). Additionally, the authors of the CAS suggested that the planning and attention subtests could also be assessed on test-retest reliability, as these are timed tests. These values have been reported to have good internal reliability (Naglieri & Das, 1997b). The content, construct and criterion-related validity of the CAS are described in the handbook.

**Description of the subtests of the standard battery of the CAS**

The 12 subtests of the standard battery of the CAS assess the processes of planning, attention, and simultaneous and successive cognitive processing. Planning is a mental process that the individual utilises to select, apply and evaluate solutions to problems that appear complex. The process of planning provides the means to solve the problem (Naglieri & Das, 1997a). This process is involved in the subtests of matching numbers, planned codes and planned connections, described below.

**Matching Numbers (MN)** – This task requires the learner to find and underline two numbers that are the same in each row. Each item has eight rows of numbers and each row contains six numbers. The response is timed.

**Planned Codes (PCd)** – This is a timed task which requires the learner to translate letters into specific codes. Each page contains one item which consists of boxes with the letters A, B, C, D. The code system of Xs and Os (e.g. A=OX; B = XX) appears at the top of each page. For each item there is a different set of codes and a different arrangement of response location.

**Planned Connections (PCn)** – This is a timed task which requires the learner to connect a series of boxes containing numbers or letters in a correct sequence. Items 1-6 contain only numbers but items 7 and 8 contain both numbers and letters. For the latter section, the learner has to match the number with the corresponding letter, in sequence.

Attention is a mental process that the individual uses to selectively focus on particular stimuli while inhibiting responses to competing stimuli presented over time (Naglieri & Das, 1997a).
This process is explored in the subtests of expressive attention, number detection and receptive attention.

**Expressive Attention (EA)** – Items 4-6 are administered as required for the 8-17 years age group. Here the learner reads words such as “blue” and “yellow” (item 4) to identify the colours of a series of rectangles (item 5) and to identify the colour ink in which colour words are printed rather than to read the words (item 6). Scoring of this task involves the score only of item 6, with item 4 and item 5 taken as practice items.

**Number Detection (ND)** – The learner is required to underline numbers on a page that match stimuli at the top of the page. Each item consists of rows of numbers which contain both targets (numbers that match the stimuli) and distracters (numbers that do not match the stimuli).

**Receptive Attention (RA)** – The task requires finding and underlining pairs of letters that are the same. Each item consists of rows of letters which contain both targets (numbers that match the stimuli) and distracters (numbers that do not match the stimuli). The letters have to be physically the same or have the same name.

The planning and attention subtests are timed tasks, and in addition require the learners to explain the strategies they use when completing the planning tasks.

Simultaneous processing is a mental process by which the individual has to integrate information into a perceptual or conceptual whole (Naglieri & Das, 1997a). This process is explored in the subtests of non-verbal matrices, verbal spatial relations and figure memory.

**Non-verbal Matrices (NVM)** – This task requires the learner to select one of the options that best completes the matrix. This subtest uses the standard progressive matrix format and varies from the completion of a simple pattern to completion of a 3x3 matrix of stimuli.

**Verbal Spatial Relations (VSR)** - Here the learner has to choose from amongst six options, the picture that correctly answers the question, read by the examiner. The questions involve logical-grammatical relations and are printed at the bottom of the stimulus page.

**Figure Memory (FM)** – The learner is required to identify a geometric figure that is embedded within a more complex design. The learner has to reproduce the figure within a more complex design in the response booklet after viewing the stimulus for a maximum of 5 seconds.
Successive processing is a mental process by which the individual integrates information in a specific serial order (Naglieri & Das, 1997a). This process is examined in the subtests of word series, sentence repetition and sentence question.

**Word Series (WS)** – Here the learner has to repeat a series of words in the same order as presented by the examiner.

**Sentence Repetition (SR)** – The learner has to repeat a series of sentences in the same order as presented by the examiner.

**Sentence Questions (SQ)** – The learner is required to answer a question about a sentence read by the examiner. Each sentence contains colour words in place of content words.

The results of the CAS within the current study were interpreted in light of it not being standardised on the South African population. This, however, may not be a major problem as the learners are compared to themselves at pre- and post-testing, as well as between experimental and control groups. For copyright reasons neither a copy of the test nor its scoring sheet can be included in the appendices.

**Rationale for using the CAS**

The CAS was selected for inclusion in this study as it evaluates the application of the four cognitive processes described by the PASS theory. These mental processes are involved when exploring and reflecting on thinking, which was the focus of the study. Additionally, the CAS's reported reliability and validity across cultures, the age range selected and its application with learners with or without special needs suggests its appropriateness and relevance (Naglieri & Das, 1997b). The CAS has also been used in previous studies in South Africa, confirming its suitability (Moonsamy, 2004; Reid et al., 2002).

**6.7.1.2 JET reading test – (JET)**

A standardised measure of reading comprehension developed by the Joint Education Trust (JET) was administered by JET's field researchers in this study. JET has been involved in testing learners since 2002, assisting in transforming the South African education curriculum. The JET reading test was designed and piloted by JET educational services in 2004, with a
report on the project published in 2005 (JET, 2005). The test was redesigned, evolving with the changes in the curriculum, and the final version of the test was approved by the DoE. Ongoing evaluation has been reported to ensure relevance and validity, in line with the expected outcomes of the curriculum. Systemic evaluation of reading in Grade three, Grade six and Grade nine in South African schools was carried out periodically. The project was designed in line with a framework of the Revised National Curriculum Statement (RNCS). The test provides key indicators of learner performance at different stages within a particular grade and across all learning phases.

Internal consistency was monitored for learner performance across the whole test as well as on individual items. Eight levels of graded reading competencies are available on two forms. The tests were piloted among 900 learners to confirm appropriate benchmarking of the test. The test was not translated into other languages at Grade six level as this grade is expected to be instructed through the medium of English in all South African English medium schools. Cronbach’s Alpha coefficient indicated high reliability at 0.90 (JET, 2005). This test was therefore suitable for use with the Grade six samples in the present study. The Grade six level tests, indicating the end of the intermediate phase, incorporate the assessment of learning against learning outcomes based at the lower-than-targeted grade, targeted grade and above- or higher-than-targeted grade. The different levels are included so as to determine the competency of the learners and to identify the level of teacher support.

The test includes skills such as reading a long story, answering questions related to the text, writing descriptive sentences, answering questions based on factual text, analysing and presenting data, reading maps and writing a short narrative. The thinking skills targeted in the tests include recall, paraphrasing, creative writing, critical thinking, data analysis, reporting and creative use of imagery. There were seven test items in the test, and learner performance was analysed in terms of the learners’ overall performance as well as per test item. The Grade 6 language test comprised 44 items, of which 26 were multiple-choice questions (MCQs); 15 required short answers and three required extended responses. The items spanned three learning outcomes (LO) as specified by the RNCS (DoE 2002), namely: reading and viewing (LO3), writing (LO4), and thinking and reasoning (LO5). The Grade 6 Language Assessment Task assesses learners’ literal, as well as abstract thinking and reasoning skills. Also their ability to access information, infer information, use language in context, and to apply information from a variety of forms, such as illustrations and graphs, is examined. The test
examines skills in critical thinking, ability to discuss intended and hidden cultural messages, the ability to select relevant from irrelevant information, as well as spatial orientation and interpreting graphical information. Furthermore, analyses, predictions, text interpretation and transferring information from graphic (map) to text (words) are included. These skills and expected outcomes are based on seven questions in the test (JET Report, 2010) and are discussed in detail below.

**JET reading comprehension questions**

**Question 1** comprises 10 items, with a maximum score of 14. It examines comprehension based on a narrative fiction text. This assesses primarily LO3 skills, testing whether the learners understand elements of the story using concepts and reasoning. While it tests learners, it also provides information for enjoyment and expects readers to respond critically to the aesthetic, cultural and emotional values in the text. Of the 10 test items, two assess the learners’ ability to write while the rest are in a MCQ format.

**Question 2** is a cloze task in which eight words are fitted into eight sentences discussing the text. The text consists of a diagram depicting the brain, accompanied by an expository text on memory. The main assessment standard is LO5 (thinking and reasoning), where the learner is able to use language to think and reason, as well as to access, process and use information for learning.

**Question 3** requires a written description of what the learners see in a given drawing, as well as describing what they think is happening. It assesses whether learners can write information, or write different kinds of factual and imaginative texts for a wide range of purposes (LO4). Assessment criteria include correct language usage, sentence structure, punctuation and creativity, linking to LO4 and LO6.

**Question 4** involves a map and learners are asked to locate the five items, give instructions and points of the compass. The questions assess whether the learner is able to read for information within LO3. This question taps into similar literacy skills as with question 1 and 2, but is extended to problem-solving skills as in LO6.

**Question 5** requires learners to interpret a timetable which consists of three test items. It assesses learners’ ability to read for information (LO3) and taps into the use of concepts and
problem-solving. It also assesses learners’ knowledge of planning with the use of a time table.

**Question 6** taps into the LO4 writing skills. For this question, six simple pictures are provided and learners are asked to describe what is happening in each picture. Learners are expected to consider the action depicted in each picture and provide a solution to the problem of “being bored on a rainy day”. Extended language usage is also assessed (LO6) in terms of creative vocabulary, correct sentence structure, proper use of nouns, pronouns and prepositions, and the correct use of punctuation.

**Question 7** comprises five items which require learners to interpret a bar graph showing the number of bottles collected by five classes. It assesses LO5 skills of thinking and reasoning, and whether learners can transfer information from one mode to another. The test also examines learners’ ability to categorise and classify information, and to group data, meaningfully. Learners are expected to engage with the data and to perform simple comparisons between subjects by interpreting the data.

For copyright reasons neither a copy of the test nor its scoring sheet could be included in the appendices.

*Rationale for inclusion of the JET reading test*

The test was selected as it is used by the DoE to evaluate learning outcomes at selected grades and was normed on the South African population. It was also designed to link to the curriculum, making it relevant and appropriate in terms of its subject content and its context. In addition, the test’s reported high reliability makes the test suitable for use with South African learners.


The CELF 3 is a test of receptive and expressive language abilities. It is used for identification, diagnosis and follow-up evaluation of language skills of the school-age and adolescent population, ranging from 6 years to 21 years 11 months. The norms may be used for quantitative measures but for this study, the test results were considered in light of the test
being standardised on the American population. It therefore provided qualitative data from which strengths and weaknesses of the sample were described. The results were used to determine whether the learners had any significant difficulties in terms of their knowledge in the subtests selected.

The CELF 3 has both auditory and visual stimuli. In addition, the test was revised to eliminate gender, racial and ethnic biases in America (Semel et al., 1995). Subtests from the 9+ age range of the test were administered, as the learners were in the age range of 11-12 years in the current study. The subtests, namely, Concepts and Directions, Formulated Sentences and Word Associations were administered. The results were not computed for analysis but provided a baseline of the learners’ language competency in the areas of receptive and expressive semantics and syntax. The entire test was not required as it was used only to screen the language competency of the learners. The CELF 3 is reported to have a good internal consistency (α = .88), test-retest and inter-rater reliability. The results vary across age ranges and across subtests (Semel et al., 1995).

The subtests administered are described below:

**Concepts and Directions** – This subtest reflects receptive knowledge, assessing the ability to interpret, recall and execute oral commands of increasing length and complexity that contain concepts requiring logical operations. This is beneficial as it would reflect how the learners in this study understand, retain and recall instructions, which is basic to processing information and learning.

**Formulated Sentences** – This subtest reflects expressive language, assessing formulation of simple, compound and complex sentences. This subtest indicates how the learners would be able to express their thoughts in oral discussions to reflect their thinking in the intervention focus group sessions as well as in class participation.

**Word Associations** – This is a supplementary subtest, reflecting expressive language skill, and which assesses recall of members of a semantic class within a time limit. The semantic skills of the learners in this study are indicated and good semantic knowledge is required for effective comprehension.
Only three subtests were selected in order to obtain a baseline measure of the learners’ receptive and expressive abilities. These would indicate their abilities, which can be correlated with the learners’ continuous assessment profiles. The results were examined in terms of standard scores and not age equivalents. A standard score of 10 and standard deviation (SD) of plus/minus 3 (i.e. a range of 7 to 13) indicates average performance, as this test is not standardised on the South African population. Learners who obtained a standard score of 6 and below would be included in the intervention programme, but be omitted from the final data analysis. As the learners were required to have had a minimum of four to five years education at a school with English as their medium of instruction, it was assumed that the learners would cope with these language subtests. Owens (2010) suggests that learners require 5-7 years to be proficient enough in their language to use it in a decontextualised manner. Additionally, the CELF 3, although not documented, is frequently used by speech and language therapists with school-aged children in South Africa, and is interpreted qualitatively.

*Rationale for the CELF 3*

The CELF 3 was selected based on its reported reliability and validity profile. It is a measure frequently used when assessing school-aged children in South Africa. The language areas in the subtests cover a wide range of semantics and syntax, which can be used qualitatively and are relevant to school-aged children. It also indicates strengths and weaknesses in specific language content.

**6.7.1.4 Curriculum-based literacy assessments**

Curriculum-based literacy measures are assessments compiled by the schools each term, based on the curriculum for that grade, as part of the continuous assessment profile of the learner. This, as discussed in the literature review, is based on the OBE system of education adopted by the DoE in South Africa. The material used by the teacher corresponded to the themes covered in that teaching period. Performances in reading, listening, speaking, language and writing were included. A final score was calculated from the literacy marks accumulated through the year. The learning outcomes (LO) at different levels, as indicated in the chapter on education, were considered in the assessment of the learner.
6.7.2 Qualitative measures

The measures described below were used to collect the qualitative data. Method triangulation, as mentioned earlier, was used in this study to achieve greater credibility of the results.

Biographical questionnaire

Parents completed the biographical questionnaire at the beginning of the study, pre-intervention. This provided background information on the learners and their families (refer to Appendix H). It included the learners’ demographics, language proficiency, the length of exposure to English as a medium of instruction, academic progress, scholastic strengths and weaknesses, and previous interventions, as well as the education levels of parents. The questions were informed by a need to establish a profile of the learner in terms of previous scholastic and learning competency, which was essential to assist in the selection of the sample.

Questionnaire on thinking strategies

A structured interview using a questionnaire was administered so that possible reading difficulties of the learners would not influence their responses. The learners described their knowledge on strategy use when approaching a reading comprehension activity. Four sections were included in this interview. In the first section, the learner had to select from a list and indicate “yes” or “no” to the strategies they would use when completing a reading comprehension activity (refer to Appendix I). The second question required them to record any other strategies not mentioned in the list provided which they would use. In the third and fourth questions, they had to indicate the strategies’ usefulness and name any two activities where they would use these strategies. The interview questions were based on establishing the baseline knowledge of the learners with respect to their knowledge and use of learning and thinking strategies used when approaching a task.

Focus groups

Topics selected for discussion in the focus groups were based on the concepts derived from the literature as well as the intervention process. These were discussed in small groups at the pre-, mid- and post-intervention phases. Themes included awareness of strategies, the context in which thinking strategies were introduced and by whom, types of strategies and how the identified strategies were applied in different learning contexts, as well as suggestions for a
way forward in terms of the intervention. This method allowed for the collation of the verbal reports and responses of the learners to the metacognitive intervention process (see Appendices R-S). Use of focus groups in this study was deemed appropriate in order to gauge the awareness and behaviour changes reported by the learners (Pucho & Potter, 2004). Furthermore, focus groups, according to Stewart and Shamdasani (1990), add depth to the responses from the quantitative data but at the same time, limitations regarding verbal reports, including the Hawthorn Effect were taken into account.

Sentence completion activity
The learners in each experimental group were required to complete two sets of sentence closure activity sheets at the end of each intervention phase. This was to demonstrate their understanding of the CEA blocks of thinking and tool of learning which were introduced in the intervention. The sentence activity examined the blocks of “exploration, planning, selective attention” and “thought integration”, as well as the tool of “self-regulation” (refer to Appendices J, K, L, M). The learners were required to define the metacognitive strategies and then to indicate their understanding of what they meant by completing a sentence. For example, “If I use self-regulation effectively then I will....” Finally, they had to name two activities where they could use these metacognitive strategies. This task indicated their understanding of the concepts introduced and reflected their skill of appropriate application.

Parent feedback
Questionnaires were completed by parents post-intervention, which provided insight regarding the learner’s strategy use and thinking skills, relating mainly to the metacognitive programme introduced in the classroom. The questionnaire examined areas of metacognitive strategy knowledge and use, the responses of the learner to tasks, as well as application of strategies to other learning situations. A Likert rating scale was applied, where the rating ranged from 1 to 5, with 1 = never, and 5 = always (refer to Appendices N-O).

Teacher feedback and observations
The teacher recorded comments and observation notes during the intervention session on learner participation. In addition, a questionnaire and interviews were completed at mid-year and final testing times. The feedback was essential in presenting the teacher’s perspective on learner responses to the metacognitive instruction, the application of the metacognitive strategies to learning. The feedback also provided suggestions to make the metacognitive
intervention more relevant and applicable to classroom contexts. A Likert rating scale was used, where the rating ranged from 1 to 5, with 1= never, and 5 = always (refer to Appendices P-Q).

6.8 Procedure for Data Collection

In the procedure outlined below, the pilot study and the main study are discussed. Ethical procedures were followed in both studies.

Permission from two schools was obtained telephonically, and information and consent letters were distributed. The researcher was allowed to address parents and guardians of the Grade six learners in the participating schools at their initial parent information forum, where the purpose and process of the study were discussed. In addition, a handout detailing the study was formulated and distributed to the parents to consolidate the introduction of the discussion. The parent evening at the control school took place a few days later. Active participation was encouraged as the assessment phase of this study was only included at this school. A subsequent handout was given to parents and teachers following this presentation.

The parents in the experimental and control schools completed a biographical questionnaire for the learners (see Appendix H). Within the experimental and control schools, the Grade six learners were grouped according to the school classes. The experimental school had three Grade six classes, of which two were selected as they had 30 learners each, at the commencement of the study. The first class was referred to as group 1 and the second class was referred to as group 2. The third class was not assessed at any stage but was included in the intervention in the second half of the year for ethical reasons, and thus their performance was not included in the analysis. The control school had two Grade six classes and both were included in the study. The learners were pre-tested on the Cognitive Assessment System (CAS), JET reading test, and the CELF 3 language test by the researcher and research assistants. The procedures for the assessments and the intervention for the experimental and control schools can be viewed in Table 6.2.
<table>
<thead>
<tr>
<th>Table 6.2</th>
<th>Procedures of the Study</th>
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Note: X=Assessment; 0=Intervention
Table 6.2 tabulates the procedures for the assessment and intervention stages used in the study, at both the experimental and control schools. The CAS was individually administered to each participant in the experimental and in the control school, at pre-, mid- and post-intervention. During the same period, the reading test was administered by the JET research field workers. Learners were given an hour to complete the JET reading test. Furthermore, the CELF 3 was administered at both schools only at the commencement of the study to determine the learners’ baseline levels of competency in English. Scoring for all measures followed the procedures in their respective manuals.

“The importance of instructions was considered, as it is the tools by which the researcher attempts to elicit the desired response and to maintain a consistent response set, across participants” (Schiavetti & Metz, 2002, p. 256). All research assistants were trained psychometrists with tertiary qualifications. Furthermore, they were trained in the test administration of the CAS and the CELF 3. The instructions utilised were consistent with those recommended by the test manual, so that reliability was maintained and a threat to internal validity, decreased. In addition, research assistants involved in the assessment data collection were blind to which group learners were assigned to in order to control for tester bias.

The learners from the experimental school were interviewed individually regarding their perceptions on strategies used when approaching a reading comprehension activity. These were recorded by the research assistants (refer to Appendix I). A focus group was arranged comprising six learners, of which three were boys and three were girls, from groups one and two in the experimental school. They were randomly selected from their class lists, and were asked to share their knowledge of thinking strategies they used at the pre-, mid- and post-intervention phases with the researcher in a structured interview.

Following the baseline testing at the experimental school, group 1 (Exp G1) was introduced to the intervention programme. Metacognitive instruction included “self-regulation; exploration, planning; selective attention and thought integration” based on the Cognitive Enrichment Advantage (CEA) (Greenberg, 2000a) and mediated learning experience (MLE) (Feuerstein et al., 1980) approaches. The programme was provided to experimental group 1 (Exp G1) in the first half of the school calendar year. The group was seen during their English lesson on Tuesday mornings from 7h45 to 8h45, a time arranged with the subject
teacher. This was important as collaboration with the school was encouraged, where the teacher was included in the intervention sessions. Details of the content of the metacognitive instruction are delineated in later sections. Experimental group 2 (Exp G2) had only regular classroom input and no intervention at this point. In addition, the control school had only regular classroom instruction and no intervention.

Evaluation of these intervention strategies for Exp G1 was completed at the end of each intervention phase by using sentence completion tasks. Learners completed two sets of individual activity sheets, relating to the blocks and tool (CEA) introduced in the intervention (refer to Appendices J, K, L, M). The curriculum-based measures were conducted by the teachers as part of the school’s regular evaluations. Experimental G1 and Exp G2, as well as the control school were then assessed on the CAS and the JET reading measures, providing the mid-year data. Experimental Group 1 and Group 2 were interviewed in focus groups providing information on their perception and awareness of thinking strategies. Experimental Group 2 then began the same intervention as Exp G1, in the second half of the school calendar year. During this time, Exp G1 continued with only regular classroom input and no further intervention. The control school also continued with only classroom instruction and no intervention.

At the end of the year, both groups one and two of the experimental school, as well as the control school were tested on the CAS and the JET reading measures, thereby providing the post-intervention data. Continuous assessment profiles of the Grade sixes in the experimental and the control schools were collected from the teachers, providing details of learner performance throughout the year. Focus groups for Exp G1 and Exp G2 were conducted immediately, post-intervention. Parent and teacher feedback from questionnaires in the experimental school were collected, describing their observations of learner responses to the intervention programme (see Appendices N, O, P). In addition, classroom observation checklists, reflecting the participation of the learners during the intervention, were completed by the teacher in the experimental school (Appendix Q). Learners were not given feedback on whether they were right or wrong in their approaches so that the effects of test practice were minimised.
The researcher in this study was not the primary interventionist, thereby controlling for experimenter bias in an intervention study and increasing the reliability of the study. The primary interventionist was a speech language therapist (SLT), with a master’s degree in speech-language pathology. By the very nature of her professional training, metacognition is a consolidated area of knowledge and practice. In addition, the interventionist was trained in CEA and Feuerstein’s mediated learning theory (MLE), in a 30-hour basic course run by a facilitator, who in turn was trained by Greenberg, the founder of CEA. Furthermore, the intervention was conducted in the classroom during the literacy period, with the teacher present. It was important that the metacognitive instruction be integrated into the literacy class and not seen in isolation or as a separate entity. Conway and Hopton (2000) support the inclusion of the metacognitive instruction into the classroom lesson. Each metacognitive lesson was scheduled for an hour every fortnight for group one and group two, according to the programme in the experimental school, as indicated in Table 6.2

**CEA metacognitive programme**

The metacognitive instruction included four “blocks of thinking” and one “tool of learning”, as only two sessions per month were available for each group in the experimental school (see Appendices U and V). The CEA metacognitive strategy was introduced in the first session and its application to reading was consolidated in the following session. The CEA “blocks and tool” were selected based on the importance of how learners’ approach their task, make meaning and confirm their learning, as well as how they monitor their learning, which motivates their engagement in the activity at hand. The selected “blocks and tool” for the intervention are presented below and were discussed in detail, in chapter 5 (intervention chapter).

The building blocks of thinking included the metacognitive strategy of “approach to task”. Here the learners were introduced to exploration and planning, which would assist them in approaching any learning experience. Exploration refers to systematically searching for information needed in the learning experience, and planning refers to preparing and using an organised approach in the learning experience. Secondly, they were introduced to “thought integration”, which refers to the ability to combine pieces of information into complete thoughts, and to retain and retrieve them when needed or while working on the task. This
would assist in “making meaning of the learning experience”. The third building block of thinking was “selective attention”, which refers to being able to choose between relevant and irrelevant information, and to focus on the information needed, “confirming the learning experience”. The tool for “motivating behaviour within the learning experience” included “self-regulation”, which refers to the individual reflecting on thoughts and actions as they occur to energise, sustain and direct behaviour towards successful learning and doing (Greenberg, 2000a, 2005a). Details of the complete list of blocks and tools are discussed in the teacher handbook (Greenberg, 2000a, 2005a). Permission was granted by Greenberg (2007) for the inclusion and use of the CEA material in the intervention programme in this study (see Appendix T).

These metacognitive strategies were presented within the context of reading comprehension activities and bridging/transcendence of learning to other contexts was encouraged. Transcendence refers to mediation that goes beyond the immediate learning. The goal of mediating transcendence is to promote the acquisition of principles, concepts or strategies that can be generalised to learning beyond the immediate, and applied to new learning in other contexts (Skuy, 1996).

Procedure for the intervention
The theory informing the intervention was discussed in chapters 3 and 5 of the literature review. Mediation of the metacognitive strategies, which reflects the process, was essential for effective instruction. The three key features of Feuerstein’s theory of mediation, namely intentionality, reciprocity, meaning and transcendence, formed the pillars of the mediation in the intervention process.

The interventionist had a specific intention or aim for each session (refer to Table 6.2 and Figure 6.2 - intervention schedule and procedure). The CEA, “block or tool”, selected was defined at the introduction session, and through questioning and engaging the learners in active participation, the meaning of that “block or tool” was unlocked and understood, accompanied by strategies that the learners could use to be effective in their reading comprehension tasks. The metacognitive and meta-strategic knowledge was developed through use of the terminology, e.g. “self-regulation”; and through discussion the learners linked their understanding of the metacognitive strategy to their life experiences. This was important as processing of information within working memory is necessary to link to the
learner’s knowledge base. Reciprocity was important for effective discussion and active engagement of the learners, so that interest and motivation could be maintained during the learning process. Once the meaning was achieved, bridging or transcendence to other learning contexts was encouraged. A plan of the intervention schedule can be seen in Figure 6.2. Activities were completed to consolidate the metacognitive concepts introduced. The learners then formulated sentences in a closure activity such as “if I use self-regulation effectively, then I will know what I need to do in this activity”. This general principle was also bridged to specific tasks at home, at school or with friends.

Figure 6.2 Process of Lesson Plan

The subsequent session involved the application of that metacognitive strategy to a reading comprehension task. It was assumed at the start of the study that the materials selected would be used to assess the learners’ reading comprehension in the experimental and control school as their curriculum-based assessment measures. However, this was not feasible as each school had its own themes and could not have additional themes introduced because of the set curriculum. It was important for the researcher to ensure that there was no interference with the current curriculum as all Grade sixes have to achieve particular outcomes. As a result
only selected comprehension texts, relating to the class themes, were incorporated into the intervention plan at the experimental school in order to consolidate the subject content of the syllabus and to work in collaboration with the teacher. The control school however selected their own material for use during the year.

The interventionist engaged the learners through discussion, individually or in small groups of two to four learners, in the process of how they would apply the metacognitive strategy to their task at hand. Both process and content were discussed. This specific application was then bridged to other school subjects and to other learning contexts. Learners were continuously allowed to make their implicit understanding of the “block or tool” explicit through sharing of their thoughts. This metacognitive focus allowed them to reflect on their thinking, which was the primary focus of the intervention in this study. Questioning and self-talk were encouraged to assist in their verbal engagement. The active participation of learners was foundational to this metacognitive intervention process and a classroom ethos of discovery was promoted.

Specific symbols [see Appendix: W] representing the ‘blocks and tool’ were discussed with the groups and subsequently placed on the classroom walls for reference (Greenberg, 2000a, 2005a). The learners were given a family “fridge page”, [see Appendix: X], which provided an explanation of the “block or tool” introduced in that session. It encouraged the family and the teacher to be part of the learning so that generalisation could be encouraged. It was also important that the new terminology introduced in the intervention was consolidated at school and in the home, as the benefits of family-school partnerships is well documented (Greenberg, 2000c, 2005c).

6.10 Data Analyses

The data analyses for mixed research methods, that is, quantitative and qualitative, applied in this study are outlined below. The scores from the CAS, JET reading and CELF 3 formed the primary quantitative data. A section of the qualitative data was quantified and formed the secondary quantitative data, and the remaining qualitative data obtained from the intervention and focus groups at the experimental school formed the third data source. A combination of the phases presented by Onwuegbuzie and Teddlie (2003), including reduction of data,
organisation and display, was applied overall. Specific methods for each approach are also explained for a comprehensive understanding. Relevant statistical (numerical precision) and content analysis (descriptive precision) procedures selected for the analyses were considered, following the examination of the sample and the data collected, to increase legitimation.

**Mixed methods analysis process**

The analysis process involved reduction of data, where the quantitative data was analysed using inferential and descriptive statistics, and the qualitative data was categorised in terms of content and descriptive themes. The data from both methods was organised and displayed visually in tables, figures, and matrices. Comparison of the data from the different sources was made, as the purpose included triangulation and complementarity (Greene et al., 1989). The data from each method was analysed at the end of the process since a concurrent strategy was applied (Onwuegbuzie & Teddlie, 2003). The data is presented separately in the analyses to demonstrate their individual outcomes; and an integration of the findings is presented in the discussion and conclusion chapters.

**Quantitative data**

For the quantitative data in this study, statistical measures included testing for reliability of the measures and normality of the data, as well as the parametric statistical tests utilised.

**Reliability of measures**

Reliability of the CAS and CELF 3 was calculated to indicate the consistency of the instruments (Van der Riet & Durrheim, 2007). This was essential as these two tests were firstly not normed on the South African population, and secondly, the CAS was used in this study as part of a repeated measures design. The JET reading test, even though it is a measure normed on the South African population, was also included in order to determine that all measures were reliable or sufficiently reliable for the sample used in this study. The tests administered had sufficient items per variable, which is important when assessing reliability of any measure. The reliability of these measures was compared to the coefficients reported in the standardisation values, as per their manuals.

**Internal consistency**
Internal consistency is typically estimated using either Cronbach’s alpha or Kuder-Richardson # 20 Formula (KR20). This is to determine the degree to which each item in a scale correlates with another (Hammond, 2003; Schiavetti & Metz, 2002). Cronbach’s coefficient alpha is a number that ranges from 0 (no internal consistency) to 1 (maximum internal consistency). Although internal consistency depends on what is being measured, a reliable internal consistency of 0.7 or 0.75 is recommended (Durrheim & Painter, 2007). Cronbach’s coefficient alpha was calculated for all items in the JET reading test, CAS and two of the subtests of the CELF 3 (sentence formulation and word association subtests). KR20 was, however, utilised in the concepts and directions subtest of the CELF 3, as the variables in this subtest were binomial in nature (Hammond, 2003).

Test-retest reliability

The pre- and post-test research design was used to determine the reliability of measures over time. Test-retest reliability requires at least a month between administration, and the five months reported in the current study was therefore considered sufficient (Hammond, 2003).

Descriptive statistics

The means, standard deviations (SD), minimum and maximum scores were obtained to provide an overall understanding of the data collected.

Inferential statistical tests

When considering the type of inferential statistical procedures to be utilised in a study, certain statistical assumptions have to be met, namely normality of the data, interval scale of measure, homogeneity of variance and a “large” sample size, (30 participants or more) (Schiavetti & Metz, 2002).

To assess the distribution of the data in this study, histograms, measures of central tendency and Kolmogorov-Smirnov Tests of Normality were used. Histograms were drawn to provide a visual image of the distribution curves. Two types of skewed distributions may occur, either positive or negative skewing. If, however, the scores are moderately skewed, then it may not be evident on visual inspection and a Pearson coefficient for skewness is calculated in such cases. A coefficient of skewness between plus or minus 0.50 indicates a non-significant deviation from the norm (Bordens & Abbot, 1991). Parametric tests were selected based on
the above assumptions about the population from which the sample was drawn. In addition, the data from the tests used in the study yielded interval data. According to Schiavetti and Metz (2002), parametric statistics are more powerful, that is, more sensitive to differences and relationships than nonparametric statistics.

Significance testing
The level of significance of 0.05 was selected as it is less conservative. This implies that the chance of committing a Type I error is 0.05 (Shaughnessy, Zechmeister & Zechmeister, 2009). Degrees of freedom (df) were also calculated when determining statistical significance.

Analysis of differences
Differences between the experimental and the control school, as well as between the two experimental groups, were examined, using t-tests for independent samples and analysis of variance (ANOVAs) (Schiavetti & Metz, 2002; Tredoux & Smith, 2007). Two-way ANOVAs were also used to examine for main effects and interactions between the dependant and independent variables. Furthermore, t-tests were calculated to assess the differences between the means, following a significant F-ratio (Schiavetti & Metz, 2002). Repeated measures ANOVAs were used to explore differences within each group (experimental and control) from pre- to post-testing.

Effect size
Effect sizes were calculated when there were significant differences between the groups, indicating the strength of the intervention effect.

Analysis of relationships
To analyse the significance of relationships between variables in the present study, Pearson Product-Moment Correlation Coefficients were calculated (Shaughnessy et al., 2009).

Qualitative data
The qualitative data collected in this study included responses from the learners, their teacher and their parents, as well as frequency counts from observation checklists. It was decided
therefore that content analysis would be an appropriate method of analysis as it includes quantification of the frequency counts, as well as thematic content analysis of the verbal responses. This may occur independently of each other or in combination (Sandelowski, 2003). Boyatzis (1998) refers to this as “quantitative translation” (p. 129). Additionally, content analysis can be applied to a quasi-experimental research design, which was done in this study (Leedy & Ormrod, 2005). Examples of responses are included to substantiate claims made and visual representations of the results are presented in matrices, pie charts and quotes. The raw data, (field notes) was organised and then coded, and categories were determined as they emerged from the data, as well as those that related to the literature (Creswell, 2009). The analysis of the qualitative data, the data display and the process of coding are explained next.

**Analysis of the qualitative data**

Content analysis, as defined by Krippendorf (1980), is “a research technique for making replicable and valid inferences from data to their context” (p. 21). The social context, sequence of events and the time in which the data was obtained are essential so that the meanings inferred are relevant (Neuman, 2006). Furthermore, these factors add value to the trustworthiness (validity) of the study. This study’s data obtained from learners, the teacher and the parents, as well as data from within the classroom and school context allowed for relevant interpretation of the meaning of the information. Terre Blanche, Durrheim and Kelly (2007) indicate that explicitness of the process and qualification of the findings are required for replicability. The process, in relation to this study, is elaborated on, in this section. Issues of reliability and validity, also referred to as legitimacy in content analysis, include stability, reproducibility and accuracy (Krippendorf, 1980). Coders must consistently recode data in the same way over a period of time and reclassify categories in the same way; and accuracy refers to the extent to which the classification corresponds to a standard. Inter-coder reliability was included in this study as two coders coded the data. The researcher was also consistent when recoding and coding the data from the qualitative measures, so that stability was maintained.

The types of coding in content analyses are described by several researchers (Krippendorf, 1980; Miles & Huberman, 1994; Terre Blanche et al., 2007). Two types namely, interpretative assumptions and social constructionism are advocated by Terre Blanche et al. (2007). Even though “interpretative assumptions” was selected for use in the analysis of the
qualitative data, the approaches described by the various researchers also influenced the conceptualisation of the data analysis process. Geertz (1973) describes interpretative analysis as “thick description”, which provides a thorough description of characteristics, process, transactions and contexts that constitute the phenomenon being studied. It is also expressed in a language related to the phenomenon, and provides an account of the researcher’s role in constructing that description (Terre Blanche et al., 2007). In addition, the analysis can be understood in terms of the three stages described by Neuman (2006), namely, open, axial and selective. In “open coding” the data is viewed initially to identify categories or key events and preliminary labels are attributed. The second stage, “axial coding”, allows for closer examination of the initial codes identified, and new themes which may emerge are noted. The final stage, “selective coding”, examines all data and previous codes. The data that support the conceptual categories are selected. These stages added value to the conceptualisation of the underlying structural framework when developing codes in this study. The codes or categories are discussed according to the data set recorded. Additionally, inferential skills applied to the data in the focus groups in this study can also be referred to as “interpretive content analysis“ or thematic content analysis (Krippendorf, 1980). Random sampling of the data was applied to create a manageable unit or set for the initial analysis as well as to identify themes. That is, six response sheets (10%) from the two experimental groups were selected for each data set. These themes were then applied to the remaining data, completing the analysis of each data set. According to Krippendorf (1980), the sample size selected can be small, but it must yield sufficient information to analyse.

Given the different perspectives by the various authors, a process that involved interpretative assumptions, as described by Terre Blanche et al. (2007), was considered to be explicit and was selected for this study as it encompassed the conceptual understanding of the phenomenon involved, and the details are described below. In addition, the qualitative data in the results chapter are displayed through matrices, analytic text and an interpretation framework presented by Miles and Huberman (1994). As different data sets were collated, including sentence completion, questionnaires and focus groups, procedures to reduce the data into manageable sets were necessary, and sampling was applied when developing the codes in this study. Content analysis examines the data in a more quantitative framework whereas thematic content analysis explores the implications of the responses of the participants. Themes are presented in the results chapter and the thematic content interpretation is indicated in the discussion chapter.
Data display

Different data sets, as mentioned above, were collated and tabulated or displayed, as organisation of data is important for a clear presentation of information. This has implications for data reduction and also informs the interpretative process. Miles and Huberman (1994) state that data reduction is a form of analysis that sharpens, focuses, discards and organises data so that final conclusions can be drawn and verified. They further describe the data display as influencing the summary of the data, identifying themes, discovering relationships between themes and developing explanations. An analytic text follows the data display, that is, text that informs and clarifies the data display, suggesting reanalysis, integration or elaboration, making comparisons and deriving meaning. This cyclical process results in a thorough organisation of the data, which impacts on the interpretation, thus adding trustworthiness and credibility to the study.

The data in this study was presented in checklists and thematic conceptual matrices, and the process of formulating them, is discussed in Step 3 of Coding, below. The matrices are included in the results section. The data comprised closed-ended questions, determining the learners’ knowledge on strategy use at baseline, and sentence completion tasks to indicate their understanding of the concepts covered in the intervention, at immediate post-testing. These were analysed using frequency counts. The perceptions of parents and the teacher were rated on a Likert scale. In addition, manifest (directly observable in the information) and latent coding (underlying the phenomenon) were used to relate the underlying implications of the data obtained over and above the frequency counts (Boyatjis, 1998). Thematic analysis was also applied to the focus group responses. These data displays were used in the interpretation of the data as the categories reflected the aims of this study. The codes or categories generated are discussed next.

Process of coding/category development

An explicit process of coding is required for replicability, therefore “interpretative assumption”, proposed by Terre Blanche et al. (2007), was selected. This process, according to Miller and Crabtree (1992), includes immersion, which refers to being thoroughly familiar with the phenomenon being studied, reflecting and then interpreting the meanings implied. The process is also quasi-statistical since it has predetermined categories indicating quantifiable data. The process of interpretative assumption applied in this study is between
immersion and quasi-statistical styles, and the five steps of the process are expanded below (Terre Blanche et al., 2007).

**Step 1. Familiarise and immerse**

It was essential to be familiar with the fundamental concepts used in this study right from the commencement of the data collection process. These concepts include mediation, metacognition, cognition, strategic knowledge, sharing of ideas and learner interaction among others. It was necessary to be cognisant of the mediated learning approach (Feuerstein, 1979) and of the cognitive theories, which underpinned the intervention fundamentally during the immersion of this process. Moreover, the researcher had to be familiar with the South African educational context, as it formed the background for the study. Patterns which emerged, as each data set was collected over the three periods of time, were highlighted and informed the initial reflection and the interpretation that these data sets would support.

**Step 2. Themes/categories**

Boyatzis (1998) indicates that themes can be theory, prior-research or data-driven. For this study, themes were identified and selected based on latent and manifest coding; the themes were data-driven and related to the research questions. Latent and manifest coding was used, as both methods reflect the underlying or implicit meaning in the text. Additionally, themes were inductively generated from the text collated. According to Miles and Huberman (1994), the codes selected must have structure and conceptual order. Also interrelations between codes were noted, as no theme is considered in isolation. Furthermore, negative case method, which refers to the interpretation of missing or omitted data within a context, was considered (Neuman, 2006). Here the information omitted by the learner or parents in their responses on the questionnaire in the present study may have been reflective of poor retrieval or lack of understanding of the concepts covered. The importance of developing good thematic codes is reflected in the fact that they can be applied in analysis, in the interpretation and in the presentation of the information (Boyatzis, 1998).

The themes selected for analysis relate to the research questions of the study. As evident in the presentation of the sub-questions, the awareness and perception of the learners, the teacher and the parents in the experimental school, regarding the metacognitive strategies introduced in the intervention, were examined but it can be seen that the questions/aims are broad and exploratory. This, as mentioned by Eagle (1998), is generally accepted within
qualitative research, as it defines the phenomenon of interest. New themes that emerged, which had not been initially identified, were also noted but the research aims were kept in mind to ensure that the interpretations would not be tangential. The language of the participants also informed some of the themes selected, e.g. opinions on thinking strategies: the learners indicated that teachers’ interactions should develop them into confident learners. Secondly, ownership of learning: a learner indicated that he/she would like to formulate rhymes to aid in recall of the new terminology used in the intervention programme.

During the theme selection process, contradictory and comparative statements expressed by the participants were considered, so that superficial summarising was avoided, e.g. one student expressed his reasons for not sharing the intervention programme with his family, while other participants indicated that they did. Such differing views added value to the understanding of the information. Several themes were identified and then prioritised into main and sub-themes. The themes identified are discussed in the results chapter.

**Step 3. Coding**

Different units of analysis exist including words, phrases, articles, characters and themes (Neuman, 2006). According to Krippendorf (1980), units are defined by the function they serve in thematic content analysis, and the selection of an appropriate unit of analysis maintains efficiency and reliability. A thematic unit of analysis was selected for this study as the data included narrative content, explanations and interpretations. Thematic analysis is defined as a process for encoding qualitative information, and the encoding requires an explicit “code” (Boyatzis, 1998).

The recording units focused on words with “yes”, indicating present or correct, and “no” indicating absent or incorrect categories, and on themes in the verbal responses. The themes generated related to the phenomenon investigated in a particular data set described below. The content may relate to more than one theme and was not restricted to one category only. e.g. the category of “Awareness” may not only include identification but could also relate to application. Terre Blanche et al. (2007) suggest that the data analysed must be meaningful with a view to clustering and identifying interrelationships between the clusters. Each task was tabulated in a specific manner as described next. Codes and themes for each task were elaborated on for a clearer understanding as well as for replicability, adding to the legitimisation of the study.
Strategies used by learners at baseline

The strategies selected by the learners in the two experimental groups were categorised into “yes” and “no” responses. Additionally, their responses to the question “usefulness of the strategies” were recorded verbatim to substantiate their expression, and the themes were extracted based on the content presented. The categories selected here represented those who found the strategies beneficial, e.g. “it helps me get through it quickly” and those who did not, e.g. “I use it but not all the time”. Their applications of the strategies were coded into common categories e.g. “home”, “school”, “sports” and “other”.

Sentence completion task

The learners’ definitions of each CEA block or tool were categorised as “correct” (e.g. the definition was clear, containing the exact concept), “partially correct” (the definition was somewhat correct but not precise) or “incorrect” (incorrect because the definition did not relate to the concept). The next aspect of the task examined their “understanding of the blocks or tool” in question, and this was coded in the same manner as for the definitions. Comments on their expression of their definitions and understandings were recorded, which supported the above categories. The final aspect of this task looked at the location of the different categories of where they could apply the strategies. The frequency of occurrence was calculated. The number of responses may not tally with the number of learners as they were allowed to write down as many examples of applications that they thought were relevant. Examples of response and categorisation sheets are included (see Appendices K and M). Latent coding was applied to the underlying implications and these are examined in the subsequent results and discussion chapters.

Focus groups

Verbal responses of the learners were recorded. Themes relating to the questions at baseline, mid-year and post-intervention were generated. Baseline sub-themes included “place or person who encouraged thinking, strategies used, awareness, explanations and usefulness of strategies, location of application, and reasoning in terms of their understanding”. Mid-year sub-themes included “place or person who encouraged thinking, strategies used, location of application in general and specifically in reading, identification of strategies, usefulness of strategies, reasoning in terms of their understanding, changes they would like to see in their
classrooms regarding the process of learning”. Post-intervention sub-themes included “place or person who encouraged thinking, sharing and transfer of these strategies, generalising of strategy use, opinions on the terminology used in the programme, and how to recall and retrieve the learning in that process”. Sub-themes were then categorised to form the main themes, as indicated in the next chapter.

**Teacher/parent perceptions**

A Likert scale was used to categorise teacher and parent responses, with 1 = never, 2 = rarely, 3 = sometimes, 4 = mostly, 5 = always. Comments were coded in terms of positive responses and negative response towards the learners’ knowledge and application of the metacognitive strategies introduced in the intervention.

The broad sub-themes identified above were then clustered into three specific main-themes: knowledge of strategies, understanding of strategies, and evaluation and opinions of metacognitive strategies, so that learner, teacher and parent perceptions could be linked, firstly, to these data sets and, secondly, could be examined in terms of their association with others including the standardised and non-standardised data.

**Step 4. Elaboration**

The data was viewed sequentially and simultaneously as learner responses were dynamic and needed to be considered in the context of the argument. This process was in-depth and all possibilities were reflected on. The process of elaboration relates to the impact the analytic text, as described by Miles and Huberman (1994), has on informing reorganisation of the data so that comparisons, relationships between themes and integration can be achieved.

**Step 5. Interpretation**

Tabulations and written notes (analytic text) on each data set were necessary so that the process could be re-examined. Following the tabulations and categorisation of data, interpretations of patterns identified were inferred relating to theory, and this is included in the results and discussion sections. This informed the implications of this study. Reflection on initial interpretations is necessary, but further reflections are important to achieve maximum meanings of the data, within the context. The process involved moving back and forth between data sets in developing the interpretation.

**Step 6. The researcher’s personal understanding influenced the interpretation**
Triangulated reflexive inquiry, as described by Patton (2001), guided the researcher’s personal engagement with the data and would have impacted on the interpretation. The importance of the awareness of subjectivity formed a critical aspect in the research. The three guidelines of self-reflexivity, reflexivity of the participants, and reflexivity regarding the audience, were considered.

The researchers’ epistemology regarding modifiability of learners was the premise on which the intervention, collection of data and interpretation was based. This epistemology supports the discussion in the chapters on cognition and language in terms of Vygotsky’s and Feuerstein’s work on cognition and learning, as well as language theories including metacognition and semantic abilities. Moreover, the epistemology is supported by the researcher’s qualification as a speech and language pathologist/therapist. It was important for the researcher to be mindful of the aim of the questions and to avoid tangential responses from the learners so that the data collected was relevant to the study. Additionally, the historical context was considered as it informed the understanding of the study’s outcomes.

The second aspect of learner reflexivity, in this study, focused on how the learners could verbalise their thoughts to achieve clarity in their thinking. Their different worldviews were encouraged when sharing information, and respect for diverse perspectives within groups was promoted. The learners’ responses indicated that there was a need for more discussions which was essential in their learning, and that the metacognitive intervention promoted an interactive process, which they stated valued their opinions and evaluations, and this is explained in the subsequent chapters.

To aid understanding, the researcher systematically collected, analysed and reported the data. Furthermore, readers within cognitive education and those who express an interest in these areas were considered by ensuring that the writing was succinct and coherent, and ensuring that the data was presented as accurately as possible to advocate trustworthiness. The quantitative and qualitative findings are presented separately for ease of understanding; the analysis techniques of each paradigm were used so that the value of each approach could be appreciated. Mixing of both types of results was considered appropriate in the discussion section.

Inter-coder reliability
To ensure that the codes or categories selected were replicable, two coders were selected from the fields of speech pathology and psychology, to code 25% of the data in each set of tasks conducted in the study. Agreements and disagreements were noted.

6.11 Ethical Considerations

The following processes were observed to ensure that the ethical principles were adhered to. To fulfil the requirements of the Humanities Ethics Committee of the University of Witwatersrand, consent was obtained from the relevant Department of Education (DoE), principals of the selected schools, teachers and parents/guardians, as well as assent from the participants. Sample letters of consent and assent are included in Appendices F and G respectively. Consent certificates and letters from the university’s ethics committees (Protocol Number: H071003), the DoE and schools are included in Appendices A, C, D, E, respectively.

The letters outlining the purpose of the study and the procedures used were also verbally explained to the DoE, principals of the schools, teachers, parents/guardians and participants, before obtaining their consent or assent. Additionally, assurance of confidentiality and the fact that learners could withdraw from the study without being penalised was also included. Letters of consent were sent to parents/guardians, following a meeting with parents at a school information evening, and permission was obtained from the participants before the study commenced. Consent from all parents at the experimental school was obtained, allowing for two Grade six class learners in this school to be included in the assessment and intervention phases of the study.

Group results of the study and the implications were available for discussion with the respective schools and parents in a prearranged feedback session. In addition, both schools were involved in teacher training workshops on metacognitive instruction following the completion of the study. All data collated during the study was coded for anonymity once captured and is only available to the researcher, thereby maintaining confidentiality.

6.12 Conclusion
This study examined the impact that a metacognitive intervention had on reading comprehension on two groups in the experimental school when compared to a control school. The research questions present the basis for this study, with the rationales confirming the contribution the outcomes would make to knowledge in the fields of educational psychology and communication intervention. Based on the literature available, it was deemed appropriate to use a mixed methods research design to collect complementary data in a natural context. Additionally, Bryman (2007) adds that a triangulation of different data sources is significant to the research outcomes, and has the potential to offer unexpected insights into the phenomena being studied. The measures administered for both the quantitative and qualitative evaluations were described in this chapter, and the rationales for their inclusion are indicated. The data were analysed using each paradigm’s techniques. Furthermore, ethical procedures, reliability and legitimation factors were taken into consideration so that the study may be replicated and maintains credibility.

Greenberg’s CEA programme was selected for use in this study and the process of the metacognitive intervention was described. The blocks of thinking and tools of learning selected for the intervention were “exploration, planning, selective attention, thought integration and self-regulation”. These metacognitive strategies were linked to the curriculum’s reading comprehension activities specifically, and then bridged to other learning areas. The methods in this study were described and justified so that rigorous practice was ensured. The results of the quantitative and qualitative data are presented separately in the next chapter to highlight each outcome, and the findings are integrated in the discussion chapter.
Chapter 7: Results
7.1 Introduction

This chapter presents the results using both descriptive and inferential statistics for the quantitative data, as well as content and thematic content analysis for the qualitative data. Different analysis techniques for each research approach were used and the results are presented separately so that each research question is appropriately answered. A series of statistical analyses was carried out to establish the reliability of the measures utilised, and the suitability of the data for parametric analysis. Furthermore, descriptive statistics to calculate the means and standard deviations, in addition to inferential statistics to explore relationships and to test significance of the differences between the variables, were applied (Howell, 2008). These analyses were used to establish the arguments for the specific research questions.

7.2 Reliability of the Measures

The following standardised measures were used in the study: CELF 3, CAS and the JET reading test, which were discussed in detail in the method chapter. It was important to establish their reliability within this study to determine whether the tests were consistently yielding the same results on retest. Internal consistency (test-retest reliability) is based on the principle that each part or item of the test is consistent with other sections of that test (Hammond, 2003). This was calculated using the Cronbach coefficient alpha and is indicated in Table 7.1.
The JET reading test in the current study indicated a Cronbach coefficient alpha of 0.64 at baseline, α = 0.61 at mid-year and α = 0.64 at final testing. These values are lower than the alpha value of 0.92 as reported by JET (2005). This may be as a result of the different sample sizes used, as JET’s considerably larger sample (N= 900) may have yielded a stronger level of consistency, as well as the characteristics of the different samples. The reliability estimate, indicated in Table 7.1, is however moderate, and acceptable as groups of individuals are considered in this study (Frisbie, 1988).

Table 7.1

<table>
<thead>
<tr>
<th>Test</th>
<th>Cronbach Coefficient Alpha</th>
<th>Standardised Variable</th>
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</thead>
<tbody>
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<td></td>
<td>Baseline</td>
<td>Mid-year</td>
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<td>JET Reading Test</td>
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<td>CAS Overall</td>
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<td>CAS Test- Retest</td>
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</tbody>
</table>
| CELF 3
  Concepts & Directions | 0.78#     |          |          |
  Formulated Sentences  | 0.67      |          |          |
  Word Associations      | 0.68      |          |          |

#: Concepts & Directions indicate a Kuder Richardson raw variable value

The reliability of the CAS was calculated to examine its internal consistency when applied to the participants. Internal consistency, on the overall CAS score, as well as the test-retest scores, across the three measurement points, was calculated. High reliability of the overall CAS scores was indicated, even though it was not as high as α =.95 to α =.97, as reported by Naglieri and Das (1997b). Additionally, the internal consistency on the test-retest CAS scores indicated Cronbach alphas of 0.75; 0.82 and 0.81. Appropriate internal consistency of the measures used in the current study is therefore evident. These values also indicate high
reliability over the three measuring points, confirming the stability of the CAS across different testing intervals, as reported by Naglieri and Das (1997b).

The Clinical Evaluation of Language Functions (CELF 3) test was administered as a baseline measure to determine whether the learners in the experimental and control groups were equivalent regarding their language competency at the commencement of the study. The internal consistency for the formulated sentences and word association subtests are moderate, as indicated by $\alpha = 0.67$ and $\alpha = 0.68$, respectively. Kuder- Richardson Formula 20 (K-R 20) was used to calculate the reliability estimate for the concepts and directions subtest as it involved binomial data, and it indicated a raw variable K-R 20 = 0.78 (Gliem & Gliem, 2003). The standardised variables are highly acceptable values for internal consistency (Durrheim & Painter, 2007).

7.3 Normality of the Data

Normality of data was determined to establish whether parametric or non-parametric tests should be used. Histograms, measures of central tendency and Kolmogorov-Smirnov tests of normality were computed. Histograms and goodness of fit tables are included in Appendices Y and Z. Examination of the data distributions from the CELF 3, CAS and the JET reading test showed that they were generally normally distributed, as indicated in Table 7.2. The data was assessed for normality across the three measuring times: baseline, mid-year and final. Slight skewing was evident on some data sets, but the histograms indicated no major concern.
Table 7.2  
Kolmogorov-Smirnov Goodness of Fit Tests for Normality Distribution

<table>
<thead>
<tr>
<th>Test</th>
<th>Baseline (D)</th>
<th>Baseline p-value</th>
<th>Mid-year (D)</th>
<th>Mid-year p-value</th>
<th>Final (D)</th>
<th>Final p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CELF 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concepts /Directions</td>
<td>0.15**</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formulated Sentences</td>
<td>0.09</td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word Assoc</td>
<td>0.08</td>
<td>&gt;0.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JET Reading Test (D)</td>
<td>0.09</td>
<td>0.07</td>
<td>0.08</td>
<td>&gt;0.15</td>
<td>0.07</td>
<td>&gt;0.15</td>
</tr>
<tr>
<td>CAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>0.07</td>
<td>&gt;0.15</td>
<td>0.11*</td>
<td>0.02</td>
<td>0.11**</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Simultaneous</td>
<td>0.08</td>
<td>&gt;0.15</td>
<td>0.08</td>
<td>&gt;0.15</td>
<td>0.1*</td>
<td>0.04</td>
</tr>
<tr>
<td>Attention</td>
<td>0.07</td>
<td>&gt;0.15</td>
<td>0.06</td>
<td>&gt;0.15</td>
<td>0.06</td>
<td>&gt;0.15</td>
</tr>
<tr>
<td>Successive</td>
<td>0.07</td>
<td>&gt;0.15</td>
<td>0.07</td>
<td>&gt;0.15</td>
<td>0.06</td>
<td>&gt;0.15</td>
</tr>
</tbody>
</table>

*p<0.05;  **p<0.01

The Kolmogorov-Smirnov test was selected as it is reported to be a more powerful measure than the other non-parametric tests of normality such as the chi-square or the Mann-Whitney U-test (Bordens & Abbot, 1991). Despite the sensitivity of the Kolmogorov-Smirnov test, the results confirmed generally normal data distributions, as non-significant values indicate normality (Gliem & Gliem, 2003). The significant p-values at the 1% and 5% levels indicate slight skewing, but on examination of the histograms’ general configurations, these were confirmed to be normal. Parametric statistical analyses of the data were therefore used based on the normality of data as indicated, as well as meeting the assumptions that the dependent variables are interval in scale and that there is homogeneity of variance. The assumption of random sampling was not met and the study was therefore quasi-experimental in nature. The results of the histograms were further confirmed by the descriptive statistics as evident in Table 7.3.
Table 7.3

Descriptive Statistics for the Tests Administered

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>CELF3 - Baseline</td>
<td>83</td>
<td>24.67</td>
<td>4.27</td>
<td>26</td>
<td>11</td>
<td>30</td>
</tr>
<tr>
<td>Concepts / Directions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formulating Sent</td>
<td>34.57</td>
<td>4.88</td>
<td>35</td>
<td>18</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>Word Assoc</td>
<td>44.06</td>
<td>8.88</td>
<td>44</td>
<td>24</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>JET Reading</td>
<td>83</td>
<td>72.39</td>
<td>8.45</td>
<td>72.97</td>
<td>48.65</td>
<td>89.19</td>
</tr>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-year</td>
<td>69.37</td>
<td>10.2</td>
<td>68.92</td>
<td>40.54</td>
<td>93.24</td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td>72.25</td>
<td>8.41</td>
<td>78.38</td>
<td>52.7</td>
<td>95.94</td>
<td></td>
</tr>
<tr>
<td>CAS</td>
<td>83</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plan</td>
<td>571.98</td>
<td>79.33</td>
<td>578</td>
<td>359</td>
<td>742</td>
<td></td>
</tr>
<tr>
<td>Sim</td>
<td>48.63</td>
<td>8.59</td>
<td>47.5</td>
<td>33</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>Att</td>
<td>125.78</td>
<td>26.65</td>
<td>121.5</td>
<td>75</td>
<td>209</td>
<td></td>
</tr>
<tr>
<td>Succ</td>
<td>36.86</td>
<td>8.08</td>
<td>37</td>
<td>14</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Mid-year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plan</td>
<td>621.13</td>
<td>67.18</td>
<td>635</td>
<td>426</td>
<td>757</td>
<td></td>
</tr>
<tr>
<td>Sim</td>
<td>52.85</td>
<td>9.59</td>
<td>52</td>
<td>32</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>Att</td>
<td>141.51</td>
<td>29.16</td>
<td>140.5</td>
<td>89</td>
<td>226</td>
<td></td>
</tr>
<tr>
<td>Succ</td>
<td>36.59</td>
<td>7.9</td>
<td>37.5</td>
<td>14</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plan</td>
<td>644.29</td>
<td>61.36</td>
<td>656</td>
<td>503</td>
<td>784</td>
<td></td>
</tr>
<tr>
<td>Sim</td>
<td>53.97</td>
<td>8.78</td>
<td>54</td>
<td>37</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>Att</td>
<td>160.83</td>
<td>29.02</td>
<td>160</td>
<td>104</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>Succ</td>
<td>37.32</td>
<td>7.82</td>
<td>37.5</td>
<td>17</td>
<td>57</td>
<td></td>
</tr>
</tbody>
</table>

Note. Plan=Planning; Sim=Simultaneous; Att=Attention; Succ=Successive

The data indicated in Table 7.3 was calculated on the raw scores for each test. The standard deviations on all subtests are acceptable. Even though the standard deviations for the CAS planning and attention subtests appear unusually large in comparison to the other subtests, they are acceptable values given the wide range of scores as indicated in their minimum and maximum scores.
7.4 Inferential Statistics

The results in this section respond to the research questions presented in the method chapter. The main research aim was to examine potential differences in reading comprehension on the JET standardised reading test between the experimental and the control schools, following the metacognitive intervention. This aim is operationalised as the following hypothesis: The experimental and control groups will indicate no significant differences in ability at pre-test on their reading comprehension. Following the intervention, however, there will be a statistically significant difference in reading comprehension between the experimental school and the control school. Data were analysed using a set of one-way analysis of variance (ANOVAs) in order to examine the differences in reading performance between the experimental and control schools. No statistically significant effect for the group factor was indicated as seen in Table 7.4. across all testing times.

<table>
<thead>
<tr>
<th>Time</th>
<th>Model df</th>
<th>Error df</th>
<th>f-value</th>
<th>p &gt; f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>2</td>
<td>80</td>
<td>2.77</td>
<td>0.07</td>
</tr>
<tr>
<td>Mid</td>
<td>2</td>
<td>80</td>
<td>2.82</td>
<td>0.07</td>
</tr>
<tr>
<td>Final</td>
<td>2</td>
<td>80</td>
<td>2.19</td>
<td>0.12</td>
</tr>
</tbody>
</table>

* p < 0.05

There was no significant difference in reading ability between the groups F (2, 80) = 2.77, p = 0.07, at pre-test, indicating that they were comparable. No significant effect for group at mid-year and final testing may be a result of the characteristics of the participants, as they were not randomly assigned, as explained in the method chapter. Bordens and Abbott (1991), and Shaughnessy et al. (2009) indicate that group variability may be caused by the variation in the independent variable, individual differences among the different subjects in the groups, experimental error, or a combination of these. However, maturation and history factors were controlled by using a repeated measures design.
Furthermore, two-way ANOVAs were computed to examine group and time interactions between the schools. The results are indicated in Table 7.5, where the ANOVAs examined the interaction between these groups over time.

Table 7.5
ANOVA Comparing Reading Performance between Experimental and Control Schools

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>N</th>
<th>DF</th>
<th>MS</th>
<th>F-value</th>
<th>p &gt; f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>249</td>
<td>1</td>
<td>941.47</td>
<td>11.9**</td>
<td>0.0007</td>
</tr>
<tr>
<td>Time</td>
<td>2</td>
<td>1</td>
<td>1322.63</td>
<td>16.71***</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Group*Time</td>
<td>2</td>
<td>2</td>
<td>12.06</td>
<td>0.15</td>
<td>0.86</td>
</tr>
</tbody>
</table>

**p<0.001; ***p < 0.0001

The group*time interaction, as seen in Table 7.5, was not statistically significant. Nevertheless, when group and time factors were considered individually, each factor was statistically significant at the 5% level. The groups in themselves were different, with the experimental school indicating an overall difference to the control school. Time was statistically significant, with F (2,249) =16.71, p<.0001, with an effect size $d = 0.13$. The effect size determines whether the difference observed is a difference that is of importance or not. For Cohen's $d$ an effect size of 0.2 to 0.3 is a “small” effect; 0.5 is a “medium” effect and 0.8 to infinity is a “large” effect (Fife-Schaw, 2003). The effect size in this reading performance is considered small but must be interpreted in the light of the sample size used in this study. In addition, least square means were computed for the two-way ANOVA to examine a best fit between time and group, as factors. The post-hoc test using Tukey-Kramer adjustments indicated that Time 1 was different from Time 3, with means at baseline (Time 1) 72.3 with $p=0.001$ and final (Time 3) 77.2, with $p<0.0001$. Despite the difference in time, the interaction between group and time factors was statistically non-significant.
The following **sub-aims and research questions**, relating to the main purpose of the study were also examined, as they present information on the specific reading performances within the groups at the experimental school. The differences in reading comprehension on the JET standardised reading evaluation between experimental group 1 (Exp G1) and experimental group 2 (Exp G2), at baseline, mid-year and post-intervention, were analysed. These aims are operationalised as the following hypotheses: Exp G1 and Exp G2 will show no significant differences on their reading comprehension at pre-test. Furthermore, it was hypothesised that there would be a difference between Exp G1 and Exp G2 in their reading scores following the intervention, at final testing, with Exp G1 doing better than Exp G2, post-intervention. It was assumed that Exp G1 would perform better as they had had the intervention in the first six months of the school year. Having had a longer exposure to the intervention process, Exp G1 may be more aware and therefore apply the strategies effectively, which may result in better performance in reading at final testing. A t-test for two independent samples was used to establish whether there was a statistically significant difference between Exp G1 and Exp G2 in their reading, at baseline, mid-year and final testing. The results are indicated in Table 7.6.
Table 7.6.
Independent Samples t-test Comparing the Experimental Groups in Reading Performance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Std Error</th>
<th>t-value</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>42</td>
<td>0.54</td>
</tr>
<tr>
<td>Exp G1</td>
<td>75.06</td>
<td>7.31</td>
<td>1.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exp G2</td>
<td>73.45</td>
<td>9.91</td>
<td>2.21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>42</td>
<td>0.3</td>
</tr>
<tr>
<td>Exp G1</td>
<td>69.88</td>
<td>10.2</td>
<td>2.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exp G2</td>
<td>73.45</td>
<td>12.29</td>
<td>2.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-1.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>42</td>
<td>0.21</td>
</tr>
<tr>
<td>Exp G1</td>
<td>80.12</td>
<td>7.53</td>
<td>1.54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exp G2</td>
<td>76.96</td>
<td>8.89</td>
<td>1.99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.28</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Exp G1 n=24; Exp G2 n=20
* p<0.05

From the results in Table 7.6, no statistically significant differences between Exp G1 and Exp G2 were noted across baseline, mid-year and final testing times. This indicates that both of the groups at the experimental school performed similarly in their reading at all three times. This is in contradiction to the research hypothesis that Exp G1 would do significantly better than Exp G2. When the means at baseline were examined, they were very similar, as expected, as no intervention had yet been introduced. However, although there is a difference in the means between Exp G1 and Exp G2 at final testing, in favour of Exp G1, no inferences can be made from these results, as no statistically significant result was obtained.

Examination of the qualitative data may yield further information in this regard and is presented later in this section.

A set of matched pair t-tests was calculated to examine within-group differences in reading performance on the JET reading test at the experimental school, across the three measuring times (see Table 7.7).
<table>
<thead>
<tr>
<th>Time</th>
<th>Exp G1</th>
<th>Exp G2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Df  d  t  p</td>
<td>Df  d  t  p</td>
</tr>
<tr>
<td>Base-mid</td>
<td>23  -5.1862 2.33 0.009*</td>
<td>19  #  #  #</td>
</tr>
<tr>
<td>Mid-final</td>
<td>23  -10.25 -5.01 &lt;.0001***</td>
<td>19  -3.514 -1.65 0.12</td>
</tr>
<tr>
<td>Base-final</td>
<td>23  -5.068 -3.29 0.003*</td>
<td>19  -3.514 -2.99 0.008*</td>
</tr>
</tbody>
</table>

Note. Time = Baseline; Mid-year; Final
* = Exp G2 no intervention Base-Mid
*p<0.05; **p<0.001; ***p<0.0001

Table 7.7 indicates that Exp G1 showed a reduced performance at mid-year following their immediate post-test, but improved in their performance at final testing (delayed post-test). The results for Exp G2, however, remained unchanged from baseline to mid-year measurement, but their performance improved slightly following their intervention phase at final testing. Exp G1 and Exp G2's performance between baseline and final testing indicated a statistically significant result at the 5% level.

The performance of the two experimental groups on the JET reading assessment was further considered, as the outcomes on the seven reading questions would provide additional clarification of their comprehension skills. Each question of the JET reading test assessed different aspects of comprehension, which would indicate between- and within- group strengths and weaknesses in the experimental school. The means for the groups on the seven questions of the JET reading test, across the three testing times, are indicated in Table 7.8.
Table 7.8

Comparing Performance of Exp G1 and Exp G2 on the Jet Reading Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Baseline</th>
<th>Mid-year</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Means</td>
<td>SD</td>
<td>Means</td>
</tr>
<tr>
<td>Q1</td>
<td>73.81</td>
<td>16.13</td>
<td>58.92</td>
</tr>
<tr>
<td>Q2</td>
<td>83.33</td>
<td>17.55</td>
<td>81.77</td>
</tr>
<tr>
<td>Q3</td>
<td>70.42</td>
<td>14.59</td>
<td>65.83</td>
</tr>
<tr>
<td>Q4</td>
<td>56.25</td>
<td>22.42</td>
<td>55.21</td>
</tr>
<tr>
<td>Q5</td>
<td>97.22</td>
<td>9.41</td>
<td>91.67</td>
</tr>
<tr>
<td>Q6</td>
<td>72.78</td>
<td>7.53</td>
<td>69.03</td>
</tr>
<tr>
<td>Q7</td>
<td>90</td>
<td>16.68</td>
<td>93.33</td>
</tr>
</tbody>
</table>

Note: Exp G1 = 24; Exp G2 = 20

Although the differences between Exp G1 and Exp G2 are slight and were not statistically significant, certain trends were noted. Table 7.8 indicates that at baseline both groups performed similarly, but at mid-year the means generally decreased for Exp G1 in comparison to Exp G2, even though not statistically significant. However, at final testing both groups indicated a trend to improve, with Exp G1 faring slightly better than Exp G2. At final testing, differences were observed in Exp G1’s performance in comparison to the means at baseline and compared to Exp G2’s means at final testing. Exp G1 seemed to show an improvement at final testing, while Exp G2 showed negligible improvement despite having had the intervention, just prior to this evaluation. Even though the performance was not statistically significant, the within-group comparisons indicated that Exp G1 showed changes in their performance from baseline to final testing, despite the decrease at mid-year. A slight, but non-significant increase in performance was noted for the majority of the questions, with the exception of question 3 and 6, which may be related to the content of the question. These questions used illustrations that required predictions and problem-solving. Gutierrez-Clellen and Quinn (1993) maintain that less information is expressed, verbally or written, when visual information is given, as it is assumed that the obvious is being stated.
Additionally, independent group t-tests were calculated to test the significance between the
groups with respect to their performance across the questions over the three testing periods
(see Table 7.9). The results, which indicated an unequal variance, applied the Satterthwaite
method and the remaining variances that were equal used the Pooled method.

<table>
<thead>
<tr>
<th>Quest Baseline</th>
<th>DF</th>
<th>t value</th>
<th>p&gt;</th>
<th>t</th>
<th>Quest Mid-year</th>
<th>DF</th>
<th>t value</th>
<th>p&gt;</th>
<th>t</th>
<th>Quest Final</th>
<th>DF</th>
<th>t value</th>
<th>p&gt;</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>42</td>
<td>0.13</td>
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</table>

#Satterthwaite method: Q2+ Baseline; Mid ;Final & Q5+ Mid; Final  
*p< 0.05

Questions 2 and 5 seemed to have unequal variances as indicated by Levene's test, hence the
Satterthwaite method rather than the Pooled method was used to indicate the variance. No
statistically significant differences were evident across any of the questions over the three
testing times. This again is in contradiction to the research hypothesis of Exp G1 performing
statistically significantly better than Exp G2. Both groups appear to have performed similarly
across the year. When examining specific questions on the JET reading test, the means for
Exp G1 at final testing were different from those of Exp G2 for questions 1, 3, 5, 6 and 7.
These questions included understanding of intended and hidden cultural messages, being able
to select relevant information and express a response, as well as make predictions, analyse
and interpret text, graphs and table. These differences cannot, however, be assumed to be
specifically indicative of the intervention, as the differences between the groups were
statistically non-significant and may also be due to other factors.
The following research aim was to compare the performance of Exp G1 and Exp G2 in their literacy continuous assessment profiles, as recorded by the class teacher, post-intervention. This aim is operationalised as the following hypothesis: Exp G1 will do better than Exp G2 in their continuous assessment profiles, post-intervention. Results at post-intervention were specifically considered instead of baseline and mid-year, as continuous assessment profiles are cumulative, where final year marks are calculated, which are linked to the learners' final academic performance. An independent t-test was used to investigate if there were any significant differences between Exp G1 and Exp G2 in their listening, reading, language and writing skills, as well as in their language and literacy totals. The results are presented in Table 7.10.

Table 7.10
T-Test Comparisons between Curriculum Measures for the Experimental Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Std Error</th>
<th>t-value</th>
<th>df</th>
<th>p-value</th>
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<tbody>
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<td></td>
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<td>Exp G1</td>
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<tr>
<td>Exp G2</td>
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<tr>
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<tr>
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<td>Exp G2</td>
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<td>1.97</td>
<td></td>
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</tbody>
</table>

Note: N= 44

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No statistically significant differences in the curriculum measures between the two experimental groups, as reported in the school records, were found. These results suggest that, academically, these groups’ literacy skills, as measured by the school’s curriculum measures, were similar at the final assessment, even though Exp G1 was perceived by the teacher as a weaker group, academically.

The next research question examined whether there were any differences in cognitive processing performance on the Cognitive Assessment System (CAS) between the experimental and the control schools, following the metacognitive intervention. This aim was operationalised as the following hypothesis: The experimental groups will perform significantly better than the control group in their cognitive processing on the CAS evaluations, post-intervention. Data were analysed using a set of ANOVAs to compare the two experimental groups and the control school on the CAS subtests across the three measurement times, and this is indicated in Table 7.11.
Table 7.11

*ANOVA Comparing the Experimental and Control Schools on the CAS subtests*

<table>
<thead>
<tr>
<th>CAS Subtests</th>
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<td>Error $df$</td>
<td>f-value</td>
<td>$p &gt; f$</td>
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<tr>
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<td>Simultaneous</td>
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<td>80</td>
<td>1.69</td>
<td>0.19</td>
</tr>
<tr>
<td>Attention</td>
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<td>80</td>
<td>0.06</td>
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<td>Successive</td>
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<td>80</td>
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<th>Error $df$</th>
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<td>Attention</td>
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<td>2.23</td>
<td>0.12</td>
</tr>
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<td>Attention</td>
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<td>79</td>
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<td>Successive</td>
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<td>79</td>
<td>6.30*</td>
<td>0.003</td>
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Note. N=82

*p < 0.05; ** p<0.001
The two experimental groups and the control group indicated no statistically significant differences at baseline, implying that the groups were similar in their cognitive processing at the commencement of the study. Post-hoc tests indicated that the planning subtest at mid-year showed a statistically significant difference between the groups, in favour of the experimental school; where Exp G1 and Exp G2 performed significantly better than the control group (5% level). Additionally, the successive subtest at mid-year and final testing indicated statistically significant differences between the groups, $F(2, 80) = 6.36, p = 0.003$ (mid-year) and $F(2, 79) = 6.3, p = 0.003$ (final), again in favour of the experimental school. At mid-year, Exp G1 performed significantly better than the control group, and at final testing Exp G1 performed significantly better than both Exp G2 and the control group on the successive subtest.

Furthermore, independent $t$-tests were computed to examine differences in performance between groups in the experimental school. This analysis examined the performance of Exp G1 and Exp G2 across the four subtests of the CAS, over the three measuring times, and the results are indicated in Table 7.12.
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<th>Att2</th>
<th>Att3</th>
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N=Exp G1=24; Exp G2 =20

Key: Plan- Planning; Sim -Simultaneous
Att- Attention; Succ - Successive

*p<0.05
Between-group differences indicated that Exp G1 performed significantly better than Exp G2 on the successive subtest at final testing only. As this cognitive process is essential for reading, it can be assumed that these cognitive processes may have influenced their reading performance, post-intervention, which was commented on by the class teacher (R, Soodyall, personal communication, 2008).

Two-way ANOVAs were calculated for group and time interaction, for each subtest of the CAS. The groups represent the experimental and the control schools, and time included the baseline, mid-year and final testing periods. The ANOVAs focused on the interaction between these groups on the four subtests of the CAS, over the three testing periods. The results are indicated in Table 7.13 and Table 7.14, respectively.
Table 7.13

ANOVA's Comparing Cognitive Performance on the CAS Subtests between the Exp and Control Schools

<table>
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<tr>
<th>Source of Variance</th>
<th>Model df</th>
<th>MS</th>
<th>f-value</th>
<th>p-value</th>
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<tr>
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<td>53774.4</td>
<td>11.6**</td>
<td>0.001</td>
</tr>
<tr>
<td>Time</td>
<td>2</td>
<td>111977</td>
<td>23.15***</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Group*Time</td>
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<td>1.64</td>
<td>0.2</td>
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</tr>
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<td>0.003</td>
</tr>
<tr>
<td>Time</td>
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<td>645.2</td>
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</tr>
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</tr>
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<tr>
<td>Time</td>
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<td>0.77</td>
<td>0.46</td>
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<td>Successive Subtest</td>
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<td>16.19***</td>
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<td>Group*Time</td>
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<td>0.54</td>
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Note. N=83
*p<0.05; **p<0.001; ***p<0.0001

Table 7.13 indicates that the group * time interaction was not statistically significant, which implies that even though the groups may have been different on their own, when time was considered as a factor, the interaction between these two factors (time and group) was not significant, which may be related to sample size. The main effect for group, however, was statistically significant for the planning and simultaneous subtests, and highly statistically significant for the successive subtest of the CAS, in favour of the experimental school.
Additionally, main effect for time was highly statistically significant for the planning and attention subtests, in favour of both groups, who showed significant improvement over the three testing times. When examining the means for these groups (see Table 7.14), the experimental school’s performance was better at mid-year and final testing, however, there was no significant statistical difference between the experimental and control groups in terms of the degree of improvement.

Table 7.14
Comparing Means of the Experimental and Control Schools on each Subtest of the CAS

<table>
<thead>
<tr>
<th>Group</th>
<th>CAS Subtest</th>
<th></th>
<th>Time</th>
<th></th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
<td>Mid-year</td>
<td></td>
<td>Final</td>
</tr>
<tr>
<td>Planning Subtest</td>
<td></td>
<td>582.61</td>
<td>645.2</td>
<td></td>
<td>651.09</td>
</tr>
<tr>
<td>Exp School</td>
<td></td>
<td>559.97</td>
<td>593.97</td>
<td></td>
<td>636.42</td>
</tr>
<tr>
<td>Control School</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simultaneous Subtest</td>
<td></td>
<td>50.16</td>
<td>54.41</td>
<td></td>
<td>55.61</td>
</tr>
<tr>
<td>Exp School</td>
<td></td>
<td>46.87</td>
<td>51.05</td>
<td></td>
<td>52.08</td>
</tr>
<tr>
<td>Control School</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attention Subtest</td>
<td></td>
<td>125.89</td>
<td>146.7</td>
<td></td>
<td>163.59</td>
</tr>
<tr>
<td>Exp School</td>
<td></td>
<td>125.66</td>
<td>135.5</td>
<td></td>
<td>157.63</td>
</tr>
<tr>
<td>Control School</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Successive Subtest</td>
<td></td>
<td>38.05</td>
<td>39.02</td>
<td></td>
<td>39.23</td>
</tr>
<tr>
<td>Exp School</td>
<td></td>
<td>35.5</td>
<td>33.79</td>
<td></td>
<td>35.11</td>
</tr>
<tr>
<td>Control School</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. N=83
The means, as evident in Table 7.14, indicated that the experimental school showed improved performance across all the subtests of the CAS, when compared to the control school, but when time was considered in the equation, the results were not statistically significant. Therefore, the research hypothesis of the experimental school performing better than the control school in their cognitive functioning on the CAS cannot be confirmed, although the experimental school was significantly better on the planning and successive processing subtests. The experimental school seems to have started and ended better, but the interaction of the group with time was not statistically significant. In addition, when the experimental and the control groups did not indicate significant differences in their performance, this may imply that the groups in themselves were variable due to individual differences and size of sample.

An additional aim in this section was to explore whether the intervention had a differential impact on low and high performers on the CAS and the JET reading outcomes, post-intervention: This aim was operationalised as the following hypothesis: The learners in the experimental school who achieved low scores on the CAS or the reading test will improve significantly following the intervention. Results were analysed using a two-way ANOVA with high and low scores and the experimental and control as the independent variables (IV), and the CAS and the JET reading results as the dependent variables (DV) (see Table 7.15). The scores were classified high or low based on the learners’ mean score obtained on the JET reading test, with scores above the mean being considered high, as this test is a measure normed on the South African population.
Table 7.15
ANOVA: Comparing High and Low Scores on the CAS at Post-test

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>DF</th>
<th>MS</th>
<th>F-value</th>
<th>p&gt;f</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>3</td>
<td>7462.19</td>
<td>2.23</td>
<td>0.09</td>
</tr>
<tr>
<td>Simultaneous</td>
<td>3</td>
<td>80.24</td>
<td>1.75</td>
<td>0.16</td>
</tr>
<tr>
<td>Attention</td>
<td>3</td>
<td>561.61</td>
<td>1.08</td>
<td>0.36</td>
</tr>
<tr>
<td>Successive</td>
<td>3</td>
<td>23.84</td>
<td>1.06</td>
<td>0.37</td>
</tr>
</tbody>
</table>

*p < 0.05

Table 7.15 indicates comparisons between the low and high scores of the CAS subtests at final testing. The ANOVA indicates that none of the models were statistically significant. It is thus evident that there are no statistical differences between high and low performers on the CAS, or between the experimental and the control school. Furthermore, no statistical significance in the interaction between level of performance * group on the CAS and the JET reading scores, post-intervention, were noted.

For the reading results, a two-way ANOVA, computed between experimental and control groups, and high and low achievers, was significant with F (3, 83) = 4.60, p< 0.005. The interaction effect, however, was not statistically significant. Type 111SS showed that the difference for main effects is between high and low achievers (p=0.0009), but that there is no statistical significance in the high and low achievers with school type interaction. Least squares post-hoc test showed that the low scorers gained more over the year than the high scorers (8.2 and 3.3, respectively). Furthermore, the low performers in the experimental school seemed to have gained slightly more than the low performers in the control school, where the means are 9.6 and 6.8 respectively. The improvement noted across the learners from both the experimental and control school may therefore be a result of maturational variables, even though a repeated measures design was applied to control for this.
Two more research questions were examined to assist the understanding of the link between cognitive processing and reading, and to examine whether or not they were drawing on similar processes. The first aim examined the relationships between the Grade six learners’ cognitive processes as evaluated by the CAS subtests, and the JET reading totals, at baseline, mid-year and final testing, in the experimental school. This was operationalised by the following hypothesis: There will be a statistically significant relationship between the CAS subtests and the JET reading totals in the experimental school, across the three testing times.

To establish the relationship between the JET reading totals and the CAS subtests, a Pearson correlation coefficient was computed for the three testing times (Howell, 2008) (see Table 7.16).

Table 7.16

<table>
<thead>
<tr>
<th>CAS</th>
<th>Reading 1</th>
<th>Reading 2</th>
<th>Reading 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>p-value</td>
<td>r</td>
</tr>
<tr>
<td>Plan1</td>
<td>0.289</td>
<td>0.06</td>
<td>0.175</td>
</tr>
<tr>
<td>Plan2</td>
<td>0.46*</td>
<td>0.002</td>
<td>0.299</td>
</tr>
<tr>
<td>Plan3</td>
<td>0.317*</td>
<td>0.04</td>
<td>0.177</td>
</tr>
<tr>
<td>Sim1</td>
<td>0.331*</td>
<td>0.03</td>
<td>0.303</td>
</tr>
<tr>
<td>Sim2</td>
<td>0.171</td>
<td>0.27</td>
<td>0.295</td>
</tr>
<tr>
<td>Sim3</td>
<td>0.194</td>
<td>0.21</td>
<td>0.247</td>
</tr>
<tr>
<td>Att1</td>
<td>0.437*</td>
<td>0.003</td>
<td>0.409*</td>
</tr>
<tr>
<td>Att2</td>
<td>0.509*</td>
<td>0.0004</td>
<td>0.256</td>
</tr>
<tr>
<td>Att3</td>
<td>0.383*</td>
<td>0.0103</td>
<td>0.208</td>
</tr>
<tr>
<td>Succ1</td>
<td>0.39*</td>
<td>0.009</td>
<td>0.44*</td>
</tr>
<tr>
<td>Succ2</td>
<td>0.406*</td>
<td>0.006</td>
<td>0.441*</td>
</tr>
<tr>
<td>Succ3</td>
<td>0.471*</td>
<td>0.001</td>
<td>0.421*</td>
</tr>
</tbody>
</table>

Note: N=44 1= baseline; 2= mid-year; 3= final
*p < 0.05; **p < 0.001; ***p < 0.0001

Many of the CAS subtests, as evident in Table 7.16, indicated statistically significant correlations with the JET reading measure, across the three testing times. Certain subtests were not statistically significant at particular times, and this may be a result of specific constructs of the test or application of knowledge required in these instances. These results
therefore suggest that the research hypothesis of a statistically significant relationship between CAS subtests and the JET reading totals can be partially accepted.

The next question examined the relationship between the CAS subtests’ totals and the JET reading questions of the learners in the experimental groups at baseline, mid-year and final testing, and the results can be seen in Table 7.17. The intention was to determine how specific comprehension skills identified in each reading question on the JET reading test link with the CAS: planning, attention and simultaneous and successive processing subtests. The aim was hypothesised as the following: A statistically significant correlation between the CAS subtests and the JET reading questions will be evident. To establish this relationship, a Pearson’s correlation coefficient was computed (Howell, 2008), and this is indicated in Table 7.17.

Table 7.17
Correlation Coefficient between CAS Subtests and Reading Questions: Exp School

<table>
<thead>
<tr>
<th>JET reading questions</th>
<th>CAS</th>
<th>Planning</th>
<th>Simultaneous</th>
<th>Attention</th>
<th>Successive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>p</td>
<td>r</td>
<td>p</td>
<td>r</td>
</tr>
<tr>
<td>Q1</td>
<td>0.30021*</td>
<td>0.001</td>
<td>0.30336**</td>
<td>0.0004</td>
<td>0.34361***</td>
</tr>
<tr>
<td>Q2</td>
<td>0.12958</td>
<td>0.14</td>
<td>0.18195*</td>
<td>0.04</td>
<td>0.25645*</td>
</tr>
<tr>
<td>Q3</td>
<td>0.05659</td>
<td>0.52</td>
<td>0.08543</td>
<td>0.33</td>
<td>0.25971*</td>
</tr>
<tr>
<td>Q4</td>
<td>0.28228*</td>
<td>0.001</td>
<td>0.35907***</td>
<td>&lt;0.001</td>
<td>0.41792***</td>
</tr>
<tr>
<td>Q5</td>
<td>0.26392*</td>
<td>0.002</td>
<td>0.12097</td>
<td>0.17</td>
<td>0.2041*</td>
</tr>
<tr>
<td>Q6</td>
<td>0.1278</td>
<td>0.14</td>
<td>0.17815*</td>
<td>0.04</td>
<td>0.12494</td>
</tr>
<tr>
<td>Q7</td>
<td>0.24677*</td>
<td>0.004</td>
<td>0.30662**</td>
<td>0.0003</td>
<td>0.07489</td>
</tr>
</tbody>
</table>

Note. N=132
*p<0.05; **p<0.001; ***p<.0001

The results depicted in Table 7.17 show the means at significance levels of p<0.05, p<0.001 and p<0.0001. Statistically significant weak to moderate relationships were noted for the
planning subtest and reading questions 1, 4, 5 and 7. For the simultaneous subtest, statistically significant weak to moderate positive correlations were indicated with reading questions 1, 2, 4, 6 and 7. The attention subtest also indicated statistically significant associations with reading questions 1, 2, 3, 4 and 5. Furthermore, the successive subtest indicated statistically significant correlations with reading questions 1, 2, 3, 4 and 6.

It is evident that JET reading questions 1 and 4 correlate significantly with all of the CAS subtests. This may be as a result of the content and cognitive processes involved, where problem-solving, reasoning and concept-processing were assessed. It is interesting to note that question 1, which covered general comprehension questions, the ability to discuss intended and hidden cultural messages, select relevant information, express how the writer manipulates the reader’s perception and connects to prior knowledge base, as well as question 4, which looked at interpretation of graphical text in maps and express knowledge of directions, were significantly correlated with all of the CAS subtests. These skills link significantly to all constructs expressed by the PASS theory.

The design of the constructs and their purpose determine the extent of the association and this is evident when specific reading questions and the subtests of the CAS are examined. Reading question 2 correlated with all of the CAS subtests except for planning, and here, the use of language to think and reason, and process information, which involved both simultaneous and successive processing, would have been required. Statistically significant correlations between question 2 and the simultaneous, attention and successive subtests were indicated but this was not evident for the planning subtest. Question 2 involves skimming, scanning, predicting and logical reasoning. Planning may not have featured here, as the skills required in this question involved linking information to prior knowledge when making predictions.

The remaining questions had stronger associations with other subtests of the CAS, and the link between the JET reading and CAS subtests has been discussed in the method chapter. Question 3, which indicated statistically significant relationships with the attention and successive subtests, involves interpreting pictorial information, expressing the learner’s interpretation, predicting, and displaying creativity and relevance. The learner had to pay attention to pictorial information, integrating information in a specific serial order, using successive processing to appropriate understanding in a creative manner (Naglieri & Das, 1997a). Question 6, which included inferencing, interpreting pictorial information, expressing
learner interpretations, use of complex sentences to show their understanding, indicated statistically significant correlations with the simultaneous and successive subtests. Here the learner had to link syntactic knowledge with previous experience when interpreting and expressing pictorial understanding. Interpreting information from a table, using deductive, logical reasoning and analytic thinking were included in question 5, and statistically significant associations with the planning and attention subtests were found. The learner had to be focused, while attending to information requiring these cognitive skills. Statistically significant correlations between question 7 and the planning and simultaneous subtests were noted. Question 7 looked at interpreting graphical text and transferring information to tables and text.

These results confirm that statistically significant relationships exist with the majority of the reading questions and the CAS subtests. Although statistically significant relationships across all the questions were not indicated, the results generally suggest that the cognitive processes assessed in the CAS are closely linked to the reading processes in the JET reading test.

7.5 Conclusion to Quantitative Data Analysis

The quantitative analysis examined comparisons between the experimental and control schools on their reading and cognitive performance, following the metacognitive intervention. Both groups were comparable in their baseline performances. For reading, no statistically significant results were indicated for the interaction between group and time. However, when considered individually, group and time factors were statistically significant. When examining these groups’ performance on the CAS, the results indicated that statistically significant differences were evident on the successive and planning subtests at final testing. The experimental school performed better than the control school on these measures but no conclusion can be drawn regarding generally better overall performance at post-test.

The groups within the experimental school were also examined, regarding their reading abilities on the JET reading test. No statistically significant differences were found between Exp G1 and Exp G2, across the three measuring times on the reading test. Both groups seemed to perform similarly despite differences in timing of the intervention. These results were also indicated in the comparison of the schools’ language curriculum records, where
both groups performed similarly at final testing. Thus, although mean differences on the JET reading test indicated that Exp G1 fared slightly better than Exp G2, results were not statistically significant. The qualitative results may yield some explanations regarding the effects of the metacognitive intervention.

Within the experimental groups, Exp G1 indicated a decrease in performance at mid-year following the intervention, but improved at final testing, while Exp G2’s performance remained unchanged between baseline and mid-year, showing negligible changes at final testing. Both groups, nevertheless, indicated a statistically significant increase in reading performance between baseline and final testing, with Exp G1 performing marginally better, but not statistically significant, than Exp G2, post-intervention. When examining the experimental groups’ performance on specific reading questions on the JET reading test, no statistical significance was noted, and the groups could be seen as performing similarly. Trends observed in their mean scores indicated that Exp G1 showed some increase in scores in comparison to Exp G2 on comprehension skills, but these were not statistically significant. Additionally, when the high and low performers were examined, no statistical differences were found in their performance on the CAS or on the reading test, post-intervention.

Numerous significant correlations were found between reading and cognitive processes, specifically for the JET reading questions 1, 2 and 4, which correlated significantly with all of the CAS subtests. This may be as a result of the content and cognitive processes involved, where problem-solving, reasoning and concept-processing were assessed. These statistically significant relationships exist with the majority of the reading questions and the CAS subtests, suggesting that the cognitive processing assessed in the CAS is closely linked to the reading processes in the JET reading test.

Since the statistical analysis did not show significantly better performance by the experimental group relative to the control, post-intervention, the qualitative data presented next may provide additional understanding of the effects of the metacognitive intervention on the learners’ reading comprehension specifically, and on their learning in general.
7.6 Qualitative Data Analysis

7.6.1 Introduction

As discussed in the method chapter, a qualitative approach was included in this study as an attempt at method triangulation. This was essential as this approach provides a foundation for the interpretation of responses from the learners, the teacher and the parents, within a natural context. According to Terre Blanche et al. (2007), this interpretative or phenomenological paradigm involves “ontological (taking the participants’ experiences seriously, as being real for them), epistemological (interacting with the participants and interpreting their experiences expressed) and methodological processes (qualitative methods and techniques to collect, and analyse data)” (pp. 273-274). This inductive approach allows for an understanding of the social phenomenon that normally cannot be described in quantitative terms. Qualitative research is sometimes reported as “unscientific because it cannot be quantified”; however, it is accepted as a useful adjunct to quantitative science (Terre Blanche et al., 2007, p. 274). For this study, an eclectic approach was applied, where a combination of interpretative assumptions (Terre Blanche et al., 2007), analytic text and checklist matrices (Miles & Huberman, 1994), as well as Krippendorf’s theoretical conceptual framework (1980) was considered.

Content analysis, which uses frequency counts, and therefore has some quantitative elements, was used together with thematic content analysis, which explores the implications of the verbal responses of the participants to analyse and interpret the results. The implications of the actual responses of the participants are best understood within a thematic content structure. Terre Blanche et al. (2007) elaborated on the importance of context as it provides the foundation for understanding the data. The content themes were coded according to concepts relating to the questions in the study. The following content themes, namely knowledge of strategies (identification and awareness), understanding of strategy use (definitions and application), and evaluation and opinions (comparisons, opinions, mediation) were selected. The aims are discussed with the themes prioritised and presented according to major and sub-themes, which may relate to the different data sets (baseline questionnaire on knowledge of strategies, sentence completion, focus groups, teacher and parent questionnaire) collated. Terre Blanche et al. (2007) stated that even though hypotheses are not generally presented in qualitative research they could be generated or framed as research questions. Analytic text for each data set is presented to provide clarity on the content and the
processes involved, which add to the description and interpretation of the results. The limitations of self-reports of learners, teacher and parents in this study were considered, and these were discussed in the method chapter. Interpretation of the results must be applied bearing these in mind. Nevertheless, controls were put into place, such as method triangulation, so that reliability and trustworthiness of the study were maintained.

The first qualitative analysis examined the awareness and perceptions of the learners in the experimental school regarding their understanding and application of the metacognitive strategies. Three different types of data sets were used, namely interview questionnaires, sentence completion tasks and focus groups. The data collected provided measures of awareness and perceptions across the different measurement times. Tables reflecting each data set, its analytic text, which provides the process involved in the data collection, and the description of the themes, are presented next. An in-depth interpretation relating to the content themes selected is presented and discussed in the discussion chapter.

7.6.2 Theme 1
The first theme “knowledge of strategies” is indicated in Table 7.18, and outlines the learners’ (participants’) responses to the baseline questionnaire on reading strategies.
Table 7.18

*Baseline Reading Strategies for the Exp Groups*

<table>
<thead>
<tr>
<th>Reading Strategies</th>
<th>Exp G1</th>
<th></th>
<th>Exp G2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Content-based</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Re-reading</td>
<td>27</td>
<td>1</td>
<td>26</td>
<td>2</td>
</tr>
<tr>
<td>Underline key words</td>
<td>16</td>
<td>12</td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>Read questions first</td>
<td>9</td>
<td>19</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>Self-regulation</td>
<td>9</td>
<td>19</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Talk alouds</td>
<td>6</td>
<td>22</td>
<td>7</td>
<td>21</td>
</tr>
<tr>
<td>Contextual clues</td>
<td>16</td>
<td>12</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Visualising</td>
<td>20</td>
<td>8</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td><strong>Metacognitive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systematic exploration</td>
<td>9</td>
<td>19</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Systematic planning</td>
<td>14</td>
<td>14</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Selective attention</td>
<td>12</td>
<td>16</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Thought integration</td>
<td>14</td>
<td>14</td>
<td>16</td>
<td>12</td>
</tr>
</tbody>
</table>

Exp G1: n= 28; Exp G2: n= 28

**Analytic text**

Table 7.18 presents the responses of all the learners in the experimental school, regarding their knowledge of strategies used in reading comprehension activities prior to the intervention. Responses from a sample of 28 learners in Exp G1 and 28 learners in Exp G2 were obtained. All the learners were individually interviewed by the research assistants. The questionnaire, given at baseline, assessed the learners’ awareness of strategies that they were familiar with, as well as how useful they felt these strategies were when completing a reading comprehension task. Examples of strategies were provided, including both content-based and metacognitive strategies, and the learners had to select strategies that they would normally use in a comprehension activity. They indicated a “yes” if the strategy was used or a “no” if it was not used. “Sometimes” was considered as a “yes” because it indicated an awareness of the strategy. Learners were asked at random to explain some of the strategies selected so that guessing would be reduced. Following this, they were required to indicate the usefulness of the strategies, as well as indicate where these strategies could be applied, other than in...
reading comprehension tasks. The latter two aspects relate to the theme “understanding of strategies”, and are discussed later.

**Description: Knowledge of strategies**

The first content theme, *knowledge of strategies* (identification and awareness), was indicated by how the learners identified strategies that they were familiar with when approaching a learning experience, for example, when comprehending a reading activity and having to explain what those strategies were about. The strategies provided in the questionnaire and their frequency counts indicating learner responses are shown in Table 7.18. Approximately 69% of learners selected content-based strategies, including re-reading, using contextual clues, visualisation and underlining of key words. Re-reading was highlighted as the main strategy applied, with 94% (53/56) of the learners indicating its use. Many learners selected the metacognitive strategies of systematic planning, thought integration and selective attention. However, when they were asked to justify their choices, it seemed that they could not differentiate between them and understood the metacognitive strategies to be similar to the content-based strategies. For example systematic planning was understood only as putting a plan into place for a task, using spider diagrams. No other explanation or strategic knowledge was mentioned. Prior to the intervention, the learners were able to identify content-based strategies introduced by the school and their parents, and they were able to apply these strategies to classroom tasks, confirming that they had knowledge of content-based strategies.

This was confirmed in the focus groups, where the learners indicated that, prior to the intervention, they were familiar with content-based strategies, including re-reading and visualisation, and they were able to explain the strategies they used frequently in reading comprehension activities. The learners stated that they used “visualisation, bar graphs, visual study maps, mind maps, visual techniques, and labelling”. They also said that they used “their imagination and could think beyond...” Most of the group stated that the metacognitive strategies of self regulation, selective attention and thought integration were unfamiliar to them even though they indicated that they knew of them in the baseline questionnaire. From the responses from the focus groups at mid-year, it was noted that learners from Exp G2 used “picture representation, read the passage then questions, key words, re-read and picked out answers; first read questions, then the passage”. This group continued with only content-
based strategies, while Exp G1, following their intervention, included metacognitive strategies in addition to content-based strategies. They stated, “we used self-regulation, planning, exploration and other strategies that we knew”. It should be noted that the learners from Exp G1 were using the terminology introduced in the intervention.

When asked if they found the content-based strategies they knew, useful, their responses indicated a definite overwhelming appreciation for strategy use, at baseline. Ninety-five percent of the learners indicated “yes”, with the remaining learners stating “sometimes”. Some examples of their response were as follows: L1, “Yes, it helps me to memorise, so that if I re-read, I don’t need to go back”; L2, “Yes, I can answer the questions correctly”; L3, “With the strategies, I do it the proper way and not in a careless way”. Others noted the following, L4, “Headings and key words: gives ideas about what you need to include”; L5, “Visualisation-imagine a picture and you are able to remember”, and L6, “Strategies helps us to remember information, better ideas, understand the questions better, helps build a picture in your mind”. A few responses indicated implications of self-regulation as indicated in these responses: L1, “Helps me to understand where I go wrong”, and L3, “Helps me get the answer, calms me down and I get the work done”. The latter examples of responses also suggest that more than content focus was involved, even if the learners were unable to recognise or express it at this point in time. This again indicates that the learners have identified and are aware of strategies introduced at school, even though the strategies may be content-based.

Their knowledge of strategies was also indicated in the second task of definition and sentence completion. The majority of the learners were able to identify the strategies introduced in the metacognitive intervention. Incorrect or omitted responses to definitions may indicate that, although they may have identified the terminology, they may not have recalled or understood the concepts sufficiently. This is discussed further in the next theme. From the baseline assessment of their awareness, the learners from both experimental groups indicated a knowledge of content-based strategies which they used in reading activities, and they also indicated that their home (parents) rather than school (teachers) enquired about their learning. Furthermore, they said that they were more alert to these strategies since the questionnaire was introduced by the researcher. The theme “knowledge of strategies” was evident throughout the study period, from baseline to final testing. The learners indicated that
identification and awareness of content-based strategies could be recalled explicitly but it was evident that an implicit knowledge of metacognitive strategies was beginning to emerge. It was clearly evident that once the metacognitive intervention was introduced, each group was able to make that implicit knowledge on awareness of metacognitive strategies, explicit.

The next issue explored how the learners understood the metacognitive strategies introduced in the intervention, at immediate-post test. This is explained in Theme 2, “understanding of strategies”.

7.6.3 Theme 2
The frequency counts presented in Table 7.19 represent the responses of the learners regarding their knowledge and understanding of the cognitive enrichment advantage (CEA) blocks of thinking and tools of learning (Greenberg, 2000a; 2005a), introduced in the metacognitive intervention in the experimental school. This data relates to the second content theme, “understanding of strategies” (definitions and application), which is discussed below. (Samples of the learners’ response sheets are included in Appendices J to K.)
## Experimental School Learners' Response to Knowledge of Blocks or Tools for Thinking: Post-Intervention

<table>
<thead>
<tr>
<th>CEA Strategies</th>
<th>Exp G1</th>
<th></th>
<th></th>
<th></th>
<th>Exp G2</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>%</td>
<td>B</td>
<td>%</td>
<td>C</td>
<td>%</td>
<td>NR</td>
</tr>
<tr>
<td>Self-regulation</td>
<td>20</td>
<td>71</td>
<td>5</td>
<td>18</td>
<td>2</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exploration</td>
<td>20</td>
<td>71</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>24</td>
<td>86</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selective attention</td>
<td>18</td>
<td>64</td>
<td>7</td>
<td>25</td>
<td>3</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thought integration</td>
<td>5</td>
<td>29</td>
<td>9</td>
<td>32</td>
<td>9</td>
<td>32</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>

### Understanding

<table>
<thead>
<tr>
<th>CEA Strategies</th>
<th>Exp G1</th>
<th></th>
<th></th>
<th></th>
<th>Exp G2</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>%</td>
<td>B</td>
<td>%</td>
<td>C</td>
<td>%</td>
<td>NR</td>
</tr>
<tr>
<td>Self-regulation</td>
<td>16</td>
<td>57</td>
<td>9</td>
<td>32</td>
<td>2</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exploration</td>
<td>16</td>
<td>57</td>
<td>6</td>
<td>21</td>
<td>5</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>18</td>
<td>64</td>
<td>6</td>
<td>21</td>
<td>3</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selective attention</td>
<td>18</td>
<td>64</td>
<td>4</td>
<td>14</td>
<td>0</td>
<td>6</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Thought integration</td>
<td>11</td>
<td>39</td>
<td>7</td>
<td>25</td>
<td>6</td>
<td>21</td>
<td>4</td>
<td>14</td>
</tr>
</tbody>
</table>

Note.  
A = Correct  
B = Partially correct  
C = Incorrect  
NR = No response

### Analytic text

The second evaluation task required the learners to define the metacognitive strategy and complete a sentence activity to demonstrate their understanding of the strategy’s application. This activity was completed after every two CEA metacognitive strategies were concluded. The responses in Table 7.19 are those of 28 learners in Exp G1 and 26 learners in Exp G2. This task involved retrieval or recall of the learning strategy, and an awareness of transfer or application of the strategy. The responses of the learners were captured on worksheets (see Appendices L to M). The data presented in the frequency matrix in Table 7.19 indicate the outcomes of the learners’ responses to the definition and understanding of the blocks and tools, namely “exploration, planning, selective attention, thought integration and self-regulation”. The responses were tabulated as “correct” (clear and concise definition), “partially correct” (definition alluded to, but not sufficiently precise), “incorrect” (incorrect concept) and “no response” (omitted response). The groups were divided into Exp G1 and Exp G2 so that comparisons could be made.
The second aspect of the task required the learners to complete a sentence, for example, “If I use self-regulation effectively then I will...” This reflected their understanding of the concept of the metacognitive strategy and its impact on their learning. Examining the written expression of their responses to the definitions and sentences also shed light on the comparisons between the groups. Finally, they were required to indicate contexts where they could use these strategies. The selection of contextual application of these strategies is indicated in Figures 7.1, 7.2, 7.3 and 7.4 presented later.

**Description: Understanding of strategies**

The majority of the responses of Exp G1 and Exp G2, as indicated in the percentages discussed, indicated that they were able to define the terms and indicate their understanding of the concept in a cloze sentence activity. The learners’ ability to express the definitions is reflective of their semantic ability, as well as their retention and recall. Most of their responses were categorised as A or B, which implies that they were correct or almost correct in their responses to most of the definitions, and in their understanding of the terms and concepts.

From the results evident in Table 7.19, Exp G1 and Exp G2’s combined responses of categories A and B to the CEA metacognitive strategies were as follows: 94% for “self-regulation”, 78% for “exploration”, 91% for “planning”, 83% for “selective attention” and 70% for “thought integration”. It can be seen that the learners had more difficulty defining the terms “exploration” and “thought integration” than they did for the other concepts. It could be that these terms were too abstract and were not retained with understanding. “Thought integration” specifically had more incorrect and no response counts than any other strategy. The learners may have not been able to link these concepts to their prior knowledge.

When defining the terms, Exp G1 and Exp G2 were able to express their definitions of “planning”, indicating good recall. Learners in Exp G2 were better than learners in Exp G1 when defining “self-regulation” and “thought integration”, but Exp G1 learners were able to define “selective attention” well, achieving 89% (category A+B, see Table 7.19). Some examples of a correct definition from the learners’ responses of the blocks and tools are as follows: “Self-regulation: “It is when you take control of yourself in different situations. You take responsibility for most things you do”, or “When you think about what you are doing and think before you do something”. Systematic exploration: “Is when you explore what to
do in different situations. E.g. if you had a project to do you would explore what your due date is, what topic you can choose, etc”. *Systematic planning:* “When you plan what you are going to do, like write in rough, brainstorm or use a spider diagram”. *Selective attention:* “When you chose one thing over another, choosing the right thing to do”, or “Selective attention is when you choose what you want to listen to. E.g. the class is making a noise and the teacher is talking, you choose what [who] to listen to help you in class”. *Thought integration:* “Is when you put together pieces of information”.

Twenty-three percent of the learners in Exp G2 had difficulty defining “*exploration*” and “*selective attention*”, and 32% of Exp G1 learners had difficulty defining “*thought integration*”. Some examples of incorrect response from the learners include the following: *Self-regulation:* “Doing something without any help from anyone and or anyone telling you to do it”. *Exploration:* “You are now being creative and you just go beyond your stopping point.” *Planning:* “systematic planning is when you are thinking of doing something”. *Selective attention:* “It is when you want people to tack [take] notice of you and you want retention [attention]”. *Thought integration*: “Is ignoring every other disruptions [disruption] and thinking about that piece of work”.

From their performance on this task, it appears that learners in Exp G1 had more difficulty expressing their definition of these terms, when compared to Exp G2, suggesting limited expressive, verbal language skill, which may be as a result of a less than adequate conceptual knowledge or that they may not have been able to recall these concepts in the assessment. Several NR (no response) (21% and 14% for selective attention and thought integration, respectively) were noted in Exp G1. The skill of defining reflects a metalinguistic process, that is, the ability to recall information learnt and to express precisely what a term means, using semantic knowledge (Nippold, 1988). Exp G1 seemed to have a conceptual understanding of these terms; however, their explanations of the concepts were often expressed in incomplete sentences, and their ideas were not always substantiated. This was indicated in their less fluent expression and in the absence of sentence complexity, relative to Exp G2. Learners from Exp G2 in comparison to Exp G1 seemed more capable of defining and expressing their understanding in the sentence closure task. These learners were described by their class teacher as good scholars based on their academic school records (R. Soodyall, personal communication, 2008). Their results indicated better expression and the
responses were more substantiated, formulating more complete thought, as indicated in their sentence structure (expressive syntax) and cohesion. They also displayed more creative ideas than Exp G1, e.g. purchasing an item needs selective attention and thought integration to be effective.

Furthermore, the learners’ understandings, as indicated in the figures below, also reflect the skill of application. The pie charts in Figures 7.1 and 7.2 indicate responses of two or more participants from Exp G1 and Exp G2 respectively, reflecting their application of self-regulation, exploration and planning strategies.

**Figure 7.1:** Exp G1 learners’ application responses of self-regulation, exploration and planning
Figure 7.2: Exp G2 learners’ application responses of self-regulation, exploration and planning

The number of responses do not tally with the number of learners as they were allowed to write down as many ideas as they thought relevant. From the proportions specified by the charts, more learners selected sports, projects and school-related tasks to indicate where they could apply exploration, planning and self-regulation strategies. The learners in Exp G1 seemed to have restricted choices when compared to Exp G2, whose choices seem to be more varied, such as relationships, travel, arguments and decision-making.

The learners’ awareness of transfer of the CEA skills involved in “selective attention” and “thought integration” is represented in Figures 7.3 and 7.4 respectively. The charts signify values from 3 or more participants’ responses. Again, the values do not tally with the number of learners who responded, as some may have indicated more than two responses.
Figure 7.3: Exp G1 learners' application responses of selective attention and thought integration.

Figure 7.4: Exp G2 learners' application responses of selective attention and thought integration.
From these responses it appears that the learners were understandably more focused on school-related issues, therefore limiting transfer to activities beyond school, when asked to indicate application of the metacognitive strategies. Tests and exams were mentioned by more Exp G1 learners than by Exp G2 learners, and this activity was conducted just prior to their June exams for the former group and closely after the November exams for Exp2. However, Exp G1 learners seemed more focused on transfer to examinations than was the other group. Again, more creative suggestions, by Exp G2 learners, were observed in the sentence completion task, such as purchasing, making decisions and crossing the road, among others.

From their definition skills, understanding of the concepts as expressed in the sentence closure, and in their awareness of relevant locations for transfer, the learners from Exp G1 and Exp G2 indicated sufficient understanding of the strategies introduced in the metacognitive intervention, immediate- post-intervention. When specific requests for transfer were required, the learners were able to make relevant choices, but limited these predominantly to school-related activities. Furthermore, Exp G1 and Exp G2’s understanding of strategies is also indicated in the data of the third task, the focus groups. Here it is evident that the learners were able to express their understanding of content-based strategies at the commencement of the study, but once introduced to metacognitive strategies, they were able to present a broader perspective and reflect on their thinking. This was clearly evident at mid-year and their responses can be seen in Table 7.20. The learners indicated that an understanding and an awareness of reflection on their thinking was important, and that they would like such processes introduced earlier in the academic year so that they could benefit from them, and consolidate their understanding of the metacognitive strategies.

The third issue examined the learners’ opinions and evaluations of the metacognitive strategies, as well as the programme introduced in the intervention. This issue is discussed next in the theme “evaluation and opinions of metacognitive strategies”.
7.6.4 Theme 3
The third content theme, "evaluation and opinions" (comparisons, opinions and mediation), is most represented in the focus groups interviews that were conducted, at baseline, mid-year and final testing. The thematic conceptual matrix, as indicated in Table 7.20, provides a wider view on the themes selected (Miles & Huberman, 1994). This content theme was informed by the data presented by the learners' responses to questions in the interview with regard to their opinions and evaluation of the intervention and its impact on their reading specifically, and on their learning in general.
<table>
<thead>
<tr>
<th>Concept</th>
<th>Baseline</th>
<th>Mid-year</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediation</td>
<td>* Parents were selected as providing mediation.</td>
<td>* Exp G1 selected school as mediator following the intervention + parents</td>
<td>* Both groups see home and school as encouraging thinking</td>
</tr>
<tr>
<td></td>
<td>* School was not indicated</td>
<td>* Exp G2 said it depended on the subjects and parents as mediators</td>
<td>* Independent use by learners in their application</td>
</tr>
<tr>
<td>Identification of strategies</td>
<td>* Types of strategies as encouraged at school</td>
<td>* Exp G1 - school CEA strategies + content-based strategies</td>
<td>* Can identify metacognitive strategies</td>
</tr>
<tr>
<td></td>
<td>* Content strategies from extra tuition e.g. Kumon</td>
<td>* Exp G2 only identified content-based strategies - as baseline</td>
<td></td>
</tr>
<tr>
<td>Awareness of strategies</td>
<td>* Generally aware of content-based strategies</td>
<td>* Exp G1 - aware of both metacognitive and content-based. Can reflect on their thinking</td>
<td>* Awareness of reflecting on their thinking</td>
</tr>
<tr>
<td></td>
<td>* Unaware of metacognitive strategies</td>
<td>* Exp G2 - subject bound, thinking not seen as influencing every task</td>
<td>* Aware that if shared with other/family they will have a shared vocabulary</td>
</tr>
<tr>
<td>Understanding of strategies</td>
<td>* Learners indicate understanding of content-based strategies</td>
<td>* Exp G1 - understanding of strategy use in broader perspective</td>
<td>* Aware of independent use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* Exp G2 - limited to content-based strategies taught at school</td>
<td></td>
</tr>
<tr>
<td>Evaluation of strategies</td>
<td>* Able to reason and justify their answers on content-base strategies</td>
<td>* Exp G1- wider perspective about thinking and reflection - can use in all subjects Sees thinking link with reading</td>
<td>* Learners express opinions on programme</td>
</tr>
<tr>
<td></td>
<td>* Able to select activities to apply strategies</td>
<td>* Exp G2- see some subjects as more challenging. Reading not considered Also indicated different approaches choices available</td>
<td>* Want to be involved in presentation of the blocks and tools</td>
</tr>
<tr>
<td></td>
<td>* Able to make comparisons in different applications</td>
<td>* ExpG1- Teachers to aid learners to be confident</td>
<td>* Want it introduced then reviewed for recall</td>
</tr>
<tr>
<td></td>
<td></td>
<td>* ExpG2 - to improve performance</td>
<td>* Expressed opinions on teachers to train and use in the classroom</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>* Need to discuss their thinking more in class</td>
</tr>
</tbody>
</table>

| Note. N=6 Learners: 3 males and 3 females |

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Analytic Text

The groups were interviewed by the researcher at the school, over the three testing times. They consisted of six learners selected randomly from their class lists, including three boys and three girls, in each group. Learners were asked specific, structured questions and their responses were transcribed, and these are summarised in Table 7.20. Some verbatim quotes and other paraphrased responses are included to substantiate statements made. At baseline, both groups were interviewed together as the intervention had not yet commenced.

At mid-year, the second focus group was conducted. Learners from the original focus group were not included in this cohort. Learners from Exp G1 and Exp G2 were interviewed separately as only Exp G1 had completed the intervention phase at this point in the process. Six learners, each with three boys and three girls, formed this group. The importance of thinking, the context of using thinking strategies, and the individuals who encouraged thinking emerged in the conceptual analysis. Although the groups were interviewed separately at mid-year, their responses are presented together. At the final interview, both groups had completed the intervention programme. The groups were interviewed separately and their responses were transcribed. Some comments included below are direct quotes, while other responses were paraphrased. Six learners, included in each group, were randomly selected from the class list, with a balance between the genders. Only the learners who did not participate in the previous two focus groups were included.

From the learners’ responses, key issues that emerged included the following: the importance of introducing thinking within the classroom; different contexts, such as reading as opposed to talking, place different demands on the thinking process; the way forward in terms of this process; and the influence of their thinking on learning. The learners now saw promotion of thinking strategies as being encouraged by both the school and the home. It was interesting to note that some learners reported that they shared information learnt in the intervention with their parents so that the parents could also use it when assisting them.

Description: Evaluation and opinions of metacognitive strategies

The content theme “evaluation and opinions of metacognitive strategies” emerged from the data collated in the three focus groups. The learners were able to express a judgement or perspective on the questions being discussed in these groups. They were asked about who
encouraged thinking in order to establish whether they perceived that thinking was promoted and mediated. At baseline, they indicated that they did not see it as being a part of their day-to-day learning in the classroom, and their responses generally indicated that their parents rather than their teachers enquired about how they studied and who assisted them. For example: L1, “My parent asks how I do my work and gives me guidance”; L2, “Generally parents ask us about our work”; L3, “At school we are not generally asked about our thinking”.

At mid-year, the learners in Exp G1 indicated that the school had been encouraging thinking skills, while some in Exp G2 qualified that thinking strategies were dependent on the subject being studied. From the responses indicated, it can be seen that learners in Exp G1, who had at this point received the intervention, seemed to have responded differently to Exp G2. The latter group continued to see thinking skills as being encouraged mainly by their homes or that thinking was only involved in specific subjects that seemed more challenging. Exp G2 continued to focus only on the content-based strategies, which were referred to in Theme 1 (knowledge and awareness of strategies). The learners in Exp G2 indicated the following responses, when asked who encouraged or mediated thinking and where this was done. L1, “My home encourages studying for exams”; L3, “Strategies on how to study are given by parents and siblings”; L4, “We are encouraged to revise and read”. Conversely, the learners in Exp G1 indicated that both school and home mediated and encouraged thinking. The learners in this group indicated the following responses. L1, “School specifically”; L4, “The teacher implies these strategies even though the teacher does not use the terminology”; L3, “Home also encouraged us to study”. Learner 2 said, “I used planning”. Strategies were also implied and parents were reported to have observed differences. Learner 6 said, “My dad noticed how more organised, I was in my work”. This group, following the intervention, was able to present a broader vision of approaching learning than the learners in Exp G2.

The learners had to compare and indicate the differences regarding the thinking processes required in contexts such as individual versus group situations, and written text versus oral presentation. From their response, it can be seen that the learners who answered, understood that different contexts present different challenges. Some responses from Exp G1: L4, “With a group, you can share and combine ideas, more options to select and each person thinks differently”; L5, “Individual, more difficult as you only have one perspective”, or
Learner 1 from Exp G2, "When reading you have the words in front of you and you can use your strategy, but with conversation, it's faster". This indicates that these learners could see the implications for reflection on thinking, but that the opportunities to reflect on their thoughts were not always available in the classroom.

The learners' views on "how important thinking is" included some insightful responses. At mid-year, when the importance of thinking was discussed, many of the learners felt that thinking strategies enhanced learning, improved scholastic performance and instituted personal change. The groups differed in terms of these views, with some of the responses confirming this view, while others not. L 3 in Exp G2 said, "Thinking gives you different approaches to academic work and that you can have a choice". Exp G1, on the other hand, who had had the intervention by mid-year, saw strategies for thinking in a broader perspective. Learner 1 in this group said, "You use strategies for life". Some learners indicated that the metacognitive strategies introduced in the intervention assisted in organising their learning and influenced their performance, e.g. L 4, "It helped organise me"; L 5, "It helped me get better results". Learner 6 stated that he did better in exams by using self-regulation. Some learners in this group indicated that they improved in school where some subject performance was low, and when they applied the strategies to their learning they saw a personal change. For example, Exp G1 (L1), "It helps you take pride in your work". Therefore, at mid-year, the group, which had had the intervention seemed to express the benefits of the metacognitive instruction, and its application. They also demonstrated their metalinguistic skills of using language to reflect on language, as well as to reflect on their thinking (Baran, 2007).

It is evident from the responses of the learners from Exp G1, that they were generally able to think about the metacognitive intervention received, and reflected on its influence on their learning. They were able to use the terminology covered in the intervention, and could explain how it helped them apply it to their tasks, while learners in Exp G2 seemed to understand strategy application in a narrower way. Some responses from learners in Exp G1 are as follows, for example L2, "Yes, at school, we learnt about self-regulation, planning, exploration, and how to navigate through a task." "Interesting", stated L2, "as we learnt to think about our thinking". Conversely, the learners in Exp G2 said that application depended on the subjects being learnt, and that mathematics, economic management science and natural
sciences were seen as challenging subjects that would require thinking. This group had not had the intervention at this point, and from their discussion on contexts for applying strategies, it can be seen that their focus on thinking was understood as only necessary in subjects that they perceived as challenging. Learners in Exp G2 said the following, for example, L3, “These subjects (maths, economic management science and natural sciences) are more challenging. Maybe they deal more with everyday life”. Some of the learners in Exp G1, however, saw it as being useful across subjects. This wider generalisation in the latter response would be linked to the principle of bridging included in the metacognitive intervention. L3 from Exp G1 learners stated, for example, “You can use it in all subjects”; L4, “We learnt how to use it with reading”; L5, “Can use it with maths, word problems or when doing a project”. When asked whether reading requires thinking, learners in Exp G2 did not generally feel that reading was difficult when compared to the subjects they had mentioned in the above responses, for example, L5, “Reading comprehension is not as difficult as the other subjects”; L3, “Also not as interesting, don’t want to think about it”. Learners in Exp G1, however, seemed to have a different perspective on reading following the intervention, and indicated a benefit as seen in this response of L2, “Yes, I see it (the reading) better, helps with organising ourselves”; L6, “It helped my comprehension”.

The learners in the focus groups were also afforded the opportunity to express their opinions on thinking strategies and the changes that they would like to include in their classroom learning. They added that their classroom learning needed to include more strategy-focused learning, and also alluded to teachers needing to present a positive interaction with learners. Exp G2 learners, at mid-year, said that they wanted to learn more strategies so that they could do better. (The intervention was only introduced to this group in the second six months of the year.) Learner 7 in Exp G1, however, felt that “teachers could encourage us rather than ‘shout’”; L4, “This breaks us down rather than building us up”. Learner 4 mentioned the example of the “former President Nelson Mandela, who worked to build our country up”; similarly, “we need teachers to build our confidence in the classroom”.

At the final interview, both groups indicated that both the home and the school were mediating thinking skills. Some learners said that they used the metacognitive strategies introduced at school independently; indicating spontaneous application, where “self-regulation” was reported to be used, to help them monitor their mental processes. Learner 2
from Exp G1 said, “The thinking strategies helped when answering questions in class”; L4 stated, “It teaches us comprehension”; L5, “You have a broader outlook in life”. It was reported that at home, the parents encouraged them to use these strategies for the exams. One learner said that she used the skills on her own to plan her work, again confirming spontaneous application. Additionally, one learner from Exp G2 stated that he didn’t share information with his parents. He (L3) said, “They come home late, and I didn’t think it was necessary; my parents are too busy, don’t always show interest”. Learners in Exp G1 said that some shared the strategies with parents, and that their parents also used the names of the metacognitive strategies introduced in the intervention. Some siblings could talk about the strategies among themselves because there was a set of twins and triplets at this school that were involved as participants in the study. Learner 5 from Exp G1 said that, “parents were told about it so that they too could use it. Parents then influence the child”.

The theme “evaluation” also relates to application of strategies, which was presented in the previous theme on “knowledge of strategies”. The learners from both Exp G1 and Exp G2 indicated the ability to evaluate strategies when applying them in activities. Transfer of these strategies was evident in activities such as planning holidays, playing games and reading. In this section, application of these strategies is presented in relation to the discussion that occurred in the focus groups. At the final interview, the learners were asked how their process of thinking could be encouraged further. They indicated that thinking strategies must be ongoing and could even be introduced in earlier grades. It was implied that this could benefit them to reach their future goals. The type of instruction seemed to emerge in their discussion, as they seemed to think that the metacognitive intervention allowed for greater expression of opinions and encouraged a broader perspective, also that active participation of learners must be encouraged by teachers. Some of the learners in the group appeared to feel restricted by traditional teaching methods and this was indicated in their view that teachers need to change their approach when teaching in the classroom.

Following their intervention, learners from Exp G2 responded to the question about whether thinking should be encouraged and how. For example, L2, “Yes, next year the work is more demanding and we need to work towards high school”; L4, “to reach our goals, to practise thinking for next year and the future”. They also indicated that the teacher should show them their marks and assist them in improving their outcomes. They indicated that teachers should encourage learners to do better and to help the learners to discover how to do better. Learner
7 said, “They must help us learn how to balance lessons and homework and to make teaching interesting because it’s not fun”. Learner 2 said, “Teachers should encourage participation, and not limit thinking when they mark exams or tests”; L1 stated, “Teachers should build self-esteem and approach the learners with respect”. Furthermore, the learners from Exp G1 said the following in response to this question: L4, “Encourage thinking skills in exams. Think about the consequences”; L6, “Thinking skills should be ongoing, to help learners in exams so that they could do better at the end of the year”; L5, “be able to control thinking better in the final exams”. Learner 3 added, “Grade sixes could share their opinions in a more mature way”; and L2, “Lessons can be in groups and in more fun ways”. Learner 6 added, “We also can share our opinions and be part of the class”; and L3 said, “Learners need to have a chance to share their ideas”; L5, “...to be encouraged to participate, to include all learners without ignoring some”; and L6, “Also to do thinking skills more frequently so that the learners get used to using them”.

These responses indicate that the learners would like to have input into their learning. Their ability to reflect on their thinking was evident in this discussion, where they believed that their opinions could add value to their learning. From their responses, it seems that within the traditional classroom set-up, little or no time is allocated to reflection of thought. The lack of time allocated to strategy instruction, as an issue was further evident in their response on the metacognitive intervention programme itself. When asked about the names or terminologies that were included in the intervention, the learners in both experimental groups felt that they needed more time to learn these metacognitive strategies so that they could become part of their learning. The terminology seemed to not have been part of their regular vocabulary. The learners from Exp G2 said the following in this regard. For example, L4, “If the names are explained they can be remembered”; L3, “Need to start early in preschool so that it becomes part of our learning”; while learner 6 from Exp G1 stated, “...use names or words that are familiar, use rhymes so that the names can be recalled”.

They indicated that to remind themselves of the thinking blocks and tools that they had learnt, they would like to have reviews at the beginning of the year and to have a more visual display of the blocks and tools. Learner 1 from the Exp G2 said, “Keep the thinking skills more frequent, on-going review”; L2, “Revise at the beginning of the new year, so that it will assist in their learning”. They stated that group discussions need to be included, for example, L5: “...because we use thinking in the groups”. From Exp G1, L6 for example mentions that,
“The posters, (depicting the ‘blocks and tools for thinking and learning’) in class can remind us to use the terms”; L7, “Use the names of the blocks and tools”; L4, “The posters need to be more evident and need to be included in class”. Learner 4 indicated, “We would like to make up the posters of these thinking skills as it will add to our learning”. They reiterated that teachers need to be included in training workshops so that teachers too can learn about thinking skills, and apply them in their teaching.

From the results discussed above, it is evident that the learners, prior to the intervention, were aware of content-based thinking strategies and their usefulness. Following the intervention, it appeared that broader perspectives were revealed, and the learners from both groups had a vocabulary to express ways of reflecting on their thinking processes. A greater awareness and heightened perceptions among learners, regarding metacognitive strategies post-intervention, was noted. The implications of these responses are included in the discussion chapter.

7.6.5 Parent perspectives on learners’ application of metacognitive strategies

Two additional questions were included in this section, which examined the parent and teacher perspectives, in comparison to those of the learners in the study. The aim was to evaluate the perceptions of the parents of these learners in the experimental school by means of a questionnaire. It was hypothesised that parents in the experimental school would be able to comment on observable changes in the learners’ approaches to their learning. The data from the questionnaires were analysed and the frequencies are displayed in Figure 7.5, and their responses were categorised into content themes, indicated in the descriptive matrix, in Table 7.21.
Figure 7.5: Parent perspectives on learner’s thinking behaviours
<table>
<thead>
<tr>
<th>Theme</th>
<th>Parent Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning areas application</td>
<td>P1: Thinking skills have been displayed during preparation of the forthcoming exams.</td>
</tr>
<tr>
<td></td>
<td>P2: She has been more structured and focused in planning for and learning ahead of exams.</td>
</tr>
<tr>
<td></td>
<td>P3: He is very thorough in planning his study for exams.</td>
</tr>
<tr>
<td></td>
<td>P3: He does time planning and decides on what needs to be learnt, and is organised and does the learning according to the schedule.</td>
</tr>
<tr>
<td></td>
<td>P4: Observed note taking before and during revision.</td>
</tr>
<tr>
<td></td>
<td>P4: Applied lessons learnt to comprehension, read the passage twice and looked for hints to answer.</td>
</tr>
<tr>
<td></td>
<td>P5: used his thinking strategies when doing his project.</td>
</tr>
<tr>
<td>Relationships</td>
<td>P1: My son is managing his relationship with his brother indicating application of his effective thinking.</td>
</tr>
<tr>
<td></td>
<td>P2: She has rethought some of her friendships and has moved towards friends who share her values.</td>
</tr>
<tr>
<td>Responsibilities</td>
<td>P1: In caring for her new puppy, she is planning on how to look after her. She decided that the puppy would stay in her room and she plans when to feed and play with her, and when she needs to sleep.</td>
</tr>
<tr>
<td>General performance</td>
<td>P1: He is very outspoken, he communicates and is organised.</td>
</tr>
<tr>
<td></td>
<td>P2: A group of five class mates were given a task to prepare a verbal advert and were given only 2 minutes. They put their 'thinking caps' on and came up with a Coca-Cola advert and they were voted first in class.</td>
</tr>
<tr>
<td></td>
<td>P3: He carefully considers what is required of him, does research and does the task at hand to the best of his ability.</td>
</tr>
<tr>
<td></td>
<td>P4: I don't know the details of the programme, so I don't feel able to comment on exactly how it has benefitted her. However, she has done a lot better at school in the last few months than ever before.</td>
</tr>
</tbody>
</table>

Note. N=15
Analytic text

Questionnaires were sent to parents after each phase of the intervention (Appendices N - O). Fifteen parents in total responded. The reason for the low return could be a result of the holiday break that followed. Also learners and parents may not have remembered to return the questionnaires. Parents were then contacted via e-mail and further questionnaires were forwarded to them, with no change to the outcomes. The results from the questionnaires are summarised in Figure 7.5 and Table 7.21. The responses, for the items on the Likert scale, are captured as frequency counts and the open comments are described using content theme.

Description: Parent perspectives on learners’ application of metacognitive strategies

The parent responses to questions 2, 3, 4, 6, 8 and 9 indicated that the learners could describe and apply the strategies learnt most of the time. They were observed to consider a variety of possibilities, which implied the use of the metacognitive strategy of exploration. For example, parents felt that their children used the skills of planning when executing tasks, self-regulation to take control of thoughts and actions, showing less impulsive behaviours, and seemed to indicate the use of selective attention, focusing on what is relevant to reach a goal.

In Figure 7.5, questions 5 and 7 refer to the learners asking questions when doing homework and using self-talk or “talk-alouds” while executing the task. Thirty-three per cent of parents indicated that their children asked questions sometimes, and 40% indicated that they asked questions always. Twenty per cent, however, indicated that their children sometimes used “talk-alouds”. Although 73% of the parents indicated that questions were used when completing tasks at home, self-talk was less frequently observed. This may reflect how learners work in class in comparison to home. More reports on use of questions and self-talk were noted by the class teacher than by the parents. This again could also reflect the discourse of instruction, where the classroom context more frequently encourages the use of questions and discussion when learning than at home.

From the open comments, patterns or themes were identified and these are displayed in Table 7.21. The content theme of application of strategies with regard to the following areas was identified: “learning areas”, “relationships and responsibilities”, and “general application”. The parents indicated that application of strategies was evident especially in preparation for exams and related learning areas. Their responses suggested that their children seemed more
focused on planning and preparing for the exams. One parent described his son as being methodical when exploring and planning his study schedule. He (P3) said, “He is very thorough in planning his studying for exams. He does time planning and what needs to be learnt, and is organised and does the learning according to the schedule”. Another parent mentioned that his child used his thinking strategies when doing a project, where “he carefully considered what was required of him, did research and completed the task at hand to the best of his ability”. Although parents may not have used the terminology introduced in the metacognitive intervention programme, they implied that their children were reflective in their thoughts and actions. The metacognitive strategies of systematic exploration, systematic planning and selective attention are implied in these responses.

The second area of application was “relationships and responsibilities”. This is evident in the responses to relationship issues with siblings and friends. Parent 2 said, “She has re-thought some of her friendships and has moved towards friends who share her values”. Parents were observing that their children were making informed decisions based on comparative cognitive skills. This also supports the principle of bridging classroom learning into everyday life situations. Furthermore, independent and spontaneous application was noted. Parent 1 noted, “In caring for her new puppy, she is planning how to look after her. She decided that the puppy would stay in her room and she plans when to feed and play with her, and when she needs to sleep”. This reflects planning, selective attention, and thought integration on the part of the child.

Furthermore, use of thinking was indicated in project application, timetable scheduling and organisation, and was indicated in the examples of general application: “He is very outspoken, he communicates and is organised”; “A group of five classmates were given a task to prepare a verbal advert and were given only 2 minutes. They put their ‘thinking caps’ on and came up with a Coca-Cola advert and they were voted first in the class”. The latter example indicates that interdependency was operational for the successful outcome, which is one of the principles of metacognitive education. Even though parent 4 was not too familiar with the intervention programme, she commented that her child had done better in her scholastic performance, and said, “I don’t know the details of the programme, so I don’t feel
able to comment on exactly how it has benefitted her. However, she has done a lot better at school in the last few months than ever before”.

From the above comments it can be seen that the learners displayed application of the strategies in the home environment, which was noted by some parents. Planning, organisation and selective attention were also indicated in the examples described, but the parents did not use the terminology introduced in the intervention to describe the behaviours, even though “fridge pages”, explaining the “CEA: blocks and tool”, were sent home weekly, following the introduction in class (see Appendix X). These parent responses indicated that those who answered the questionnaire in the experimental school were able to comment on observable changes in the learners’ approach to their learning. It is possible the more invested parents may have been the ones who responded to the questionnaire. Several of the parent comments were supported by similar examples from the learners and the teacher.

7.6.6 Teacher’s perspectives on the learners

The next question examined the perspectives of the class teacher in the experimental school, using a questionnaire. It was hypothesised that the teacher in the experimental school would be able to comment on observed changes in the learners when they approached their learning at school, as she was included in the intervention and was the English subject teacher for these groups. Table 7.22 indicates the frequency counts based on the Likert scale.
**Table 7.22**  
*Class Teacher's Perceptions at Mid-year in the Experimental School*

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Learners’ performance</th>
</tr>
</thead>
</table>
| Sometimes | Learners consider all possibilities  
The learners apply the strategies when doing written tasks |
| Mostly    | The learners use the labels (terminology) to describe the strategies most of the time  
The learners show an understanding of the strategies learnt  
The learners are generally less impulsive, taking time to think  
The learners talk aloud while doing a task  
The strategies are generalised to other subjects at school |
| Always    | The learners indicate application of strategies learnt, to solve problem situations  
The learners engage more effectively in oral tasks  
The learners are asking more questions  
The learners indicate that they focus on what is relevant to reach a goal |

Note. N=1

**Analytic text**

The class teacher was interviewed by means of a questionnaire at mid-year and an interview at end of the post-intervention phase. This teacher was included in the class intervention, and her perceptions of the learners both during the metacognitive intervention, as well as in her class teaching, were noted. The analysis is indicated in Table 7.22 above. The open comments, at mid-year as well as at the interview post-intervention, are presented below.

**Description of the teacher’s perspective**

At mid-year, the teacher felt that learners in Exp G1, who had had the intervention, always indicated application of the metacognitive strategies learnt to solve problems. She specifically reported that they engaged effectively in oral tasks, asked more questions than prior to the intervention, and indicated a focus on what was relevant to reach a goal. She added further that learners in Exp G1 used the terminology, given in the intervention, to describe the strategies most of the time, showing understanding and recall. The teacher said, “They were less impulsive, taking more time to think and they generalised their strategy application to other subjects”. She also indicated that this group (Exp G1) used “talk-alouds” while doing a task. She felt that they sometimes, but not always, considered all possibilities before
answering. However, they were not often seen to be spontaneous in their application of the metacognitive strategies to their written tasks.

The teacher’s observations expressed, suggested a positive perception of a class that the staff of the school was initially very concerned about. This was clearly articulated by the teacher in the following comment:

The programme was run during the first six months only with Exp G1. This class performed better than the other two classes on their comprehension results in the June exam. This is usually not the case. The exam included more inferential questions which are more taxing on the learners.

The teacher also noted changes in the class as a whole since the metacognitive intervention. The primary interventionist’s evaluation report also confirmed the initial uncertainty of Exp G1. She said, “This group was difficult to work with as their attention to the tasks was not maintained and that group work was not always successful in the initial part of the intervention” (P. Nilsson, personal communication, 2008). The teacher added, “They are generally more disruptive as a group but changes in performance were noted. One particular learner performed better, and this learner’s disruptive behaviour was the main concern.” This learner, described by his teacher as having problematic behaviours, indicated in the focus group interview that he used self-regulation, and that he performed better in his exams. This comment from the learner corroborated the teacher’s observation.

The teacher’s feedback at the final stage following the intervention indicated the difference in learning behaviours, observed. She said:

Both classes used the terms and applied the strategies, but they need to be reminded to do so and spontaneous use is not always evident, currently. At the beginning of the year, Exp G1 also had difficulty forming a cohesive group, but that changed and the ethos of this class now showed a willingness to work together. These classes (Exp G1 and Exp G2) show a competitive spirit and their general knowledge is good.
The teacher indicated that teaching English to these groups was highly rewarding. She indicated:

Exp G2’s response to the intervention was difficult to explore as the programme was conducted in the second term which had additional activities. However, Exp G1 seemed to have responded better than Exp G2 to the intervention. Although Exp G2 is a ‘brighter class’ they did not show the same response to the intervention as Exp G1.

The teacher also stated that she learnt from being involved in the programme and that the concepts introduced in the intervention may be implicit in teaching practice but are not always explicit when teaching. She said, “The programme, however, has explicit reference to the strategies”.

From these comments, it is evident that the teacher noted observable changes in the learners, with Exp G1 seeming to benefit more than Exp G2 from the intervention, although both groups were comparable at baseline testing. Overall though both groups needed encouragement to recall the metacognitive strategies in lessons, and they demonstrated a competitive spirit when engaging in groups. The interesting point in this interview was that this teacher, who experienced the intervention in class, said that the instruction in the metacognitive intervention was explicit in its metacognitive strategy input when compared to regular classroom instruction.

7. 6.7 Commonalities in teacher, parent and learner perspectives

Some commonalities or trends were noted when the different perspectives were analysed. The learners indicated that the metacognitive intervention used some conceptual knowledge that the class teacher implied when teaching, even though she does not use the same terminology. The teacher confirmed this when she said that some of these metacognitive concepts are implicit in teaching but not explicit in their classroom instruction, but that the metacognitive intervention programme made “explicit reference to the strategies”. The learners, once they were involved in the intervention, were aware of their parents’ observation of changes in their approach to tasks. In fact, one learner said that his father commented on his organisational skills being more evident. The learners’ application of these
metacognitive strategies, which was part of an activity in class, reflected their use in contexts such as in relationships, projects and exams. This was also commented on in their parents’ observations, and the parents especially commented on the children’s application of the skills to relationships, which is an essential part of the learners’ social and emotional development at this age. The learners mentioned that group work fostered more challenges and discussions, which allowed for reflection. This was alluded to by the teacher who commented that a competitive spirit was evident in the groups, and especially mentioned that Exp G1, who had difficulty forming a cohesive group, began to show changes in this regard. The teacher agreed that the learners applied their learning of the metacognitive strategies but that spontaneous application was not always present.

The differences in the teacher and parent comments with regard to the use of questions when doing their homework or self-talk when engaging in a complex task may be related to the contextual environment, i.e. between home and school. The teacher may also have been more alert to questioning behaviour as the classroom context does encourage this skill. “Talk-alouds” or self-talk may have been observed by the teacher more frequently than by the parents, as it is a strategy used in classroom teaching and learning. Despite these differences, both the teacher and the parents were able to comment on observable positive changes in the learners, following the intervention.

7.7 Conclusion of Qualitative Data Analysis

At baseline the learners were able to identify and recall content-based thinking strategies, such as visualisation, re-reading and underlining key words. Furthermore, they indicated some although limited awareness of metacognitive strategy use when they said that such strategies helped them monitor their work. Even though they were explicit about content-based strategies, some implicit knowledge of metacognition was emerging, unknown to the learners, as this reflective process was not explicit in classroom instruction at that point. It was evident that when the metacognitive intervention was introduced, the learners were able to make their awareness and knowledge of the metacognitive strategies more explicit. This may have been due to the opportunity of verbalising their thinking while engaging in
cooperative leaning, and through the provision of terminology for the metacognitive strategies. Oral expression is a process of sharing, making their implicit knowledge explicit, and, according to Greenberg (2005a) and Feuerstein et al. (1980), sharing knowledge energises learning, which fosters interdependency. This process of interchange motivates learning behaviour and the learners make their implicit knowledge explicit, consolidating understanding.

The learners’ definition skills, post-intervention, indicated their understanding of the metacognitive strategies of self-regulation, exploration, planning, selective attention and thought integration. Exp G2 seemed to have performed better in this task than Exp G1, as their expression of terms and their understanding was presented in a more cohesive manner with good sentence structure, and a more varied use of examples in the application of strategies. Some of Exp G1’s performance may have been as a result of less than adequate recall or limited linguistic skills.

Prior to the introduction of the metacognitive intervention, the learners’ evaluations and opinions regarding their thinking and learning were narrowly focused. They seemed to view the home and the school contexts as not being mutually supportive of each other with regard to their learning. The learners also saw their subjects mainly in terms of the content, and they thought that learning, which seemed easy, did not require the use of metacognitive strategies. Once the intervention was introduced, however, their perspectives seemed to broaden, as they then viewed the metacognitive strategies as life-long skills, necessary for all learning, and they realised that the metacognitive strategies gave them opportunities to share their knowledge. Additionally, they experienced the metacognitive instruction as an opportunity for discussion among themselves, which stimulated learning as the discussions promoted the application of metacognitive strategies. The duration of the intervention was mentioned as important for consolidation of learning and it was pointed out that such interventions need to be a continuous part of the curriculum. The learners’ responses also pointed out the important role played by ownership and participation in the preparation of materials to make this type of intervention successful.

The teacher and the parents noticed positive observable changes in the learners, and described the learners as being more reflective in their thinking. Even though the terminology introduced in the intervention was not used frequently, an understanding of the underlying concepts was indicated. The teacher indicated that spontaneous use of the metacognitive
strategies was not evident, especially in written tasks and reminders were needed. Some limitations of qualitative design were acknowledged but which did not minimise the impact noted. The limitations with regard to self-reporting - retrospectively rather than while doing a task - and the Hawthorn Effect were considered, as these could have influenced the outcomes.

7.8 Summary of Quantitative and Qualitative Results

Quantitative and qualitative analyses were performed in order to obtain a comprehensive picture of the data. The results were discussed separately to allow the link between the research questions and the outcomes to be clear. The quantitative data indicated comparisons between the experimental and control schools on their reading and cognitive performance, following the metacognitive intervention. Both groups were comparable in their baseline performances.

For reading, no statistically significant results for the interaction between group and time were indicated. When time was considered as a factor, no significant difference in terms of the degree of improvement was noted for either group. Therefore, the results failed to reject the hypothesis that the experimental school would perform significantly better than the control school. Consequently, no significant impact could be attributed to the intervention. This may have been related to sample size, learner differences and/or the duration of the intervention, among others. When examining the groups’ performance on the CAS, results indicated that only the successive and the planning subtests improved significantly for the experimental school from pre- to post-test.

The groups within the experimental school were also examined regarding their reading abilities on the JET test. The results indicated no statistically significant differences between Exp G1 and Exp G2 across the three measuring times for reading, suggesting that both groups seemed to perform similarly despite the intervention. Similar results were found when comparing the groups’ language skills in the school’s curriculum records, even though Exp G1 was indicated by the teacher as being weaker academically. The qualitative data was useful in providing a deeper understanding of the effects of the metacognitive intervention on reading comprehension specifically, and on learning in general.
Statistically significant correlations between reading and cognitive processes on the CAS were indicated, specifically for JET reading questions 1, 2 and 4, which correlated with all of the CAS subtests. This suggests that the cognitive processes assessed in the CAS are closely linked to the reading processes in the JET reading test.

In the qualitative analysis, the perspectives of the learners, teacher and parents were considered in terms of the content themes: “Knowledge and awareness of strategies”, “understanding of strategies” and “evaluation and opinions of strategies”. The learner perspectives were inferred from three data sets, namely the baseline questionnaire on knowledge of strategies, a task on definitions and sentence completion, and the final task of focus group interviews. The results indicated that the learners in Exp G1 and Exp G2 were able to identify and recall content-based strategies prior to the intervention. However, following the intervention, both groups were explicit in their reflection on their use of the metacognitive strategies, as indicated in their discussions and completion of sentence tasks. They were able to define the concepts, indicate appropriate applications, as well as evaluate the intervention’s content and process, suggesting ideas for future implementation of the metacognitive intervention. The qualitative analysis seemed to indicate that the learners in Exp G1 engaged more with the metacognitive intervention than the learners in Exp G2, which may be a result of the former group having had a longer exposure to the awareness of their metacognition due to the cross-lagged design of the intervention. Nevertheless, both groups highlighted the opportunities for discussion and collaborative knowledge construction created during the metacognitive intervention. The duration of such a programme and the need for metacognitive instruction to be a continuous part of their programme were also pointed out.

The teacher and parent responses were obtained from interviews and questionnaires respectively. The responses indicated that positive noticeable changes in the learners were observed, with the learners being described as being reflective in their learning. The terminology introduced in the intervention, however, was not always used to express their comments but an understanding of the underlying concepts was indicated. The teacher felt that although the learners required reminders in some tasks to apply their metacognitive strategies they were frequently eager to do so. However, limited transfer to written tasks was reported. Greater awareness and understanding of the metacognitive strategies and their
influence on learning was nevertheless indicated by the learners, their teacher and the parents, who responded.

Limitations relating to the quantitative and qualitative analyses have to be considered when interpreting the implications, and the details are presented in the conclusion of this thesis. The implications of these results are integrated in the discussion chapter next in order to enable a clearer understanding of the theoretical and empirical findings.
8.1 Introduction

The ultimate purpose of education is aptly described in the above quote. It conveys the understanding that learning evolves predominantly from the content of the information, as well as the strategies associated with that learning, and it is these strategies which are transferred to new learning contexts, making learners independent thinkers. This reflects the philosophy or premise that underpins this study.

Metacognition and cognition are processes which are foundational in many intervention programmes in psychology, education and communication disorders. Published research of these intervention studies is essential for evidence-based learning, so that models of best practice can emerge. Despite the long history of metacognition and cognition in these fields, insufficient reporting on these intervention practices has been noted both internationally and locally, which are neglected opportunities of testing the theories, limiting clinical and theoretical significance. The limited publishing of these practices may be due to several reasons, one of which is the difficulty in analysing and reporting abstract thinking processes (Garton, 2004). These thinking processes are generally examined by methods of self-reporting which, according to Johnson and Onwuegbuzie (2004), are considered debatable by some researchers, due to the subjectivity. Furthermore, the thinking process is dynamic in its constitution and is influenced by many variables, and therefore the description of the process may not seem precise enough. Research in this area nevertheless needs to be reported, as reflection on thinking is fundamental for effective learning. Berk (2003) indicates that through verbalisation and reflection on thinking, higher cognitive processes develop. Additionally, thinking is monitored when expressed in social interaction with others, making the implicit mental processes explicit. To overcome the limited published research in the areas of metacognition and cognition, recent pragmatic approaches such as mixed methods research designs could be applied to effectively investigate these
approaches. Creswell, Plano Clark, Gutmann and Hanson (2003) indicate that self-reporting in metacognitive research can be coupled with rigorous interpretative analyses and maintain legitimacy.

Like metacognitive instruction, education generally has numerous goals for learners, one of which is to develop global citizens who can effectively use thinking skills. These goals therefore have implications for both instruction and learning. The type of instruction in education is crucial as it impacts on learner outcomes. According to Feuerstein and Falik (2010), the academic curriculum is based on an implicit assumption that learners will acquire efficient learning processes, which they will use to access instruction, acquire further knowledge and apply their learning to other contexts. Improved approaches to learning, and specifically to literacy, need to be considered in order to raise the standards of outcomes, internationally and especially in South Africa. It is therefore hypothesised that explicit metacognitive instruction will impact significantly on learner performance, as the focus is on the process rather than the product (Haywood, 1977).

Typical school curricula do not emphasise metacognition explicitly but it is nevertheless part of its pedagogy, as indicated in the South African curriculum documents (DoE, 2002). Mediation provided by the teacher within the classroom should assist learners to generalise their learning to novel situations, as well as to develop intrinsic motivation to be independent and interdependent "thinkers" (Haywood, 2003). Mediation may be assumed to be good teaching, but Greenberg (2005a) differentiates between the concepts of mediation and good teaching, indicating that mediation focuses on the process of learning, in addition to the content. The present study thus contributes to the conceptual understanding of mediation by examining the effectiveness of metacognitive instruction on reading comprehension and cognitive processing in Grade six learners in two South African schools.

A mixed methods research design was utilised, and was explained in the method chapter. In addition, the quantitative and qualitative data were analysed, and presented separately in the results chapter. However, an integration of these findings is warranted here, so that the conceptual and theoretical phenomena supporting the evidence may be appreciated. Moreover, an integration of the results is essential as the outcomes in this study are more than the sum of the individual quantitative and qualitative parts (Bryman, 2007). The qualitative data adds
validity, as well as depth and detail that the quantitative findings may lack. The quantitative results examined whether the differences between the groups were statistically significant, as well as whether any significant correlations between the reading and the cognitive measures were indicated. The qualitative results described the knowledge and perceptions of the learners, the class teacher and the parents in the experimental school with regard to the metacognitive instruction. The data, obtained from these participants are discussed, linking them to the literature reviewed earlier. Three content themes were identified from the following learner activities: sentence completion, focus groups and the learners’ baseline perceptions of strategy knowledge. Furthermore, the teacher and the parent responses augmented the themes identified. These responses were analysed using thematic content analysis.

The findings of this study are discussed in relation to its theoretical premise and the intervention studies reviewed in the previous chapters in order to substantiate the conclusions drawn. Firstly, reading, and then cognitive performance, between the experimental and control schools are examined. This is followed by comparisons of reading and cognition within- and between-groups in the experimental school. In addition, identification of trends in the skills of reading and cognition is linked to achievement, where the low- versus the high-performing learners is considered in both schools. Correlations between the reading and the cognitive measures, which provide an overall understanding of the concepts involved in processing of these skills, are also explored. The qualitative data, as indicated earlier, yielded responses from three groups of participants in the experimental school. The objectives achieved in this study are presented throughout the discussion, and specific reference to tables and figures in the results chapter is made to link the arguments with the evidence. The limitations of self-reporting were considered when analysing the qualitative data, as Halpern (1987), and Jacobs and Paris (1987) suggest that self-reporting may not reflect reality, where claims can be made even though the reflection of thought may not have been experienced. Moreover, the beliefs of the individual cannot be taken on their own as an index of those skills. This study therefore considered these potential limitations and examined several data sets, using method triangulation, in an attempt to support the knowledge, application of strategies and the perceptions of the learners, adding discriminant and convergent validity (Green et al., 1989). Additionally, generalisation or transferability from
this purposive sampling is cautioned, as the findings need to be understood within the context of this study (Patton, 2001). The sample size was also small and not random, and therefore limits the generalisability of the results. The results on reading and cognition relating to the research questions are discussed next, and provide an understanding of the outcomes, and support the findings with literature discussed in the previous chapters.

8.2 Reading Performance on the Jet Reading Test

The reading performance of the experimental and control schools was compared over the three measurement times. In addition, between- and within-group comparisons in the experimental school, including their continuous assessment profiles at final testing were made (see Tables 7.4 and 7.5).

8.2.1 Comparisons between the experimental and control schools on their reading performance

No statistically significant differences were found between the experimental and the control school on the JET reading test, across all three measurement times. A lack of a significant interaction between group and time may be due to the sample size in this study. The purposive sampling used was based on the educational context - class groups were predetermined by the school and could not be altered. In addition, applying a cross-over design in the intervention at different periods for each class within the experimental school also meant that the groups had to remain as preset classes. Secondly, the original sample experienced some attrition as a result of the inclusion criteria, which required that learners had to be present for the JET reading and the CAS testing over all three testing periods in order to be included in the final analysis. Therefore, learners who had missed any of the assessments, due to their absence from school at the point of testing, were omitted from the final sample. Although the size of the sample in this study may be considered as a limitation, it nevertheless did not negatively influence the statistical power of the analysis. Another factor that could have influenced learner performance is that of individual differences, such as intrinsic factors, including motivation and willingness to learn (Cottrell, 2001). Bordens and Abbott (1991), and Tredoux and Smith (2007) indicate that such group
variability may be as a result of individual learner differences, and that these differences exert more of an impact the smaller the sample is. A larger sample therefore may reduce the potential effect of individual differences, and this should be taken into account in future intervention studies.

Both the experimental and control groups, even though they were comparable at the commencement of the study, improved over time, indicating a statistically significant outcome at the 5% level. This occurred despite the control group not having received any intervention. The improvement in both groups, irrespective of the intervention, may relate to their learning environments as well as their socio-economic contexts. Moloi and Strauss (2005) indicate that learners from higher socio-economic status (SES) groups do better at reading for meaning (comprehension) than learners from lower SES groups. Both sets of learners may have thus improved in their reading performance, since they are situated in more affluent urban areas, as reflected by their school fee structure. These schools, as indicated in the method chapter, were allocated a DoE poverty index of 5, which indicates the highest household income ranges, confirming that these learners are generally from higher SES groups (DoE- create, 2009). Thus the improvement observed in these learners’ reading may have been a result of their environment, maturation and teaching over time.

It was also expected that when time was considered as a factor, the experimental and the control groups would perform increasingly better as learners would be more than likely able to apply their instruction with more understanding. Slight, but not statistically significant, differences were noted in the reading scores of the experimental groups in comparison to the control school at post-intervention. Examining the reading performance within the groups in the experimental school will therefore provide an opportunity to gain a broader perspective of the learners’ knowledge and experience of metacognition, and this is presented next. A limitation, however, is that no qualitative data from the control school was obtained since the qualitative data was directly related to the intervention, and this may be considered for inclusion in future studies. It is important to remember that the experimental school had two groups in the study, and that each acted as a control group, relating to the cross-over design in the intervention.
8.2.2 Comparisons of reading performance between and within the experimental groups

The groups within the experimental school were examined with regard to their performance on the Jet reading test and their continuous assessment portfolios. Their knowledge and perceptions on the metacognitive intervention were also recorded. These quantitative and qualitative measures add value to understanding the two groups who received the intervention, and also help to evaluate the impact that the design format had on the outcomes. In other words, these measures assisted in determining whether the learners in Exp G1 introduced to the metacognitive strategies first would benefit more than the learners in Exp G2, who received the intervention in the second half of the year. It was hypothesised that Exp G1 would do significantly better than Exp G2, as the metacognitive intervention was introduced to them in the first six months and therefore their extended exposure should have created a deeper awareness of the strategies.

At the commencement of the study, Exp G1 and Exp G2 showed similar ability levels in their reading comprehension. This allowed for differences at mid-year and final testing to be examined, and these changes could be attributed to certain variables, including the intervention. According to Tredoux and Smith (2007), the equivalence of the groups at baseline counteracts the threat to internal validity of regression to the mean. This was also important as the learners were conveniently assigned into the intervention groups, with the researcher having no prior knowledge of the classes. Similarity in the groups was also indicated in the qualitative data, where their knowledge of strategies was comparable at the start of the study. The learners’ responses in the baseline interview, as described in the content theme “knowledge of strategies” indicated that they were aware of and could identify some strategies prior to the intervention (Table 7.18). The learners were able to recall content-based strategies that were introduced at school, as well as indicate their application to reading contexts. They expressed the benefits of these strategies, reflecting the importance of the scaffolding that education had provided. Ninety-five per cent of the learners, when asked if they had found the content-based strategies useful, agreed that their good performance was related to their application of these strategies as they provided guidelines and direction, giving them a method when learning. Although these content-based strategies do create some level of awareness in the reader, they do not encourage explicit reflection of thought. Campione (1987) maintains that content-based strategies do not explicitly encourage the metacognitive processes of reflection, monitoring and evaluation. Metacognition as a skill needs to be made explicit to learners through instruction, which then has implications
for educational pedagogy. A tacit assumption exists that learners are taught content, which requires cognitive skills, but are never taught how to think because they should “know how to think” (Halpern, 1987, p. 76). Hay (2000) believes that the method of instruction should rather focus on the process than on the content. Content, however, need not be abandoned and a balance between mediation (instruction, which is the process) and the content (product) is advocated by Haywood (1977), as both are fundamental to learning.

Furthermore, the learners’ responses in the baseline interview implied the use of self-regulation. This indicates that some form of introspection was evident, and that some learners were beginning to monitor and evaluate their thinking process, even though they may not have been aware of doing so, as they indicated that the strategies assisted them when learning. The following responses support the findings, “it helps me get the answer”; “it calms me down, and I get the work done”. These statements imply some reflective thought processes, to which the learners may not have been alert, as their classroom instruction may not have made reflection explicit. This was reiterated by the class teacher, who indicated that the metacognitive intervention programme made explicit reference to the strategies, which were implicit in teaching pedagogy but were not always explicit in regular classroom instruction. Haywood (1997) argues that learners need to have explicit instruction of the strategies as spontaneous application is not always evident for some learners. This argument is supported by Greenberg (2000a, 2005a), who says that unless instruction makes “implicit knowledge” explicit, strategy knowledge cannot be used effectively or as widely as it could to enhance learning. Eilers and Pinkley (2006) also describe explicit instruction as a valuable tool because of its influence on reading. The importance of explicit instruction in metacognition therefore needs to be promoted in future intervention research and needs to be practised in classroom teaching.

When examining post-intervention results in the experimental school, it is important to be clear about the concepts of immediate and delayed post-test, as this relates to the cross-over design of the intervention, and also has implications for learner outcomes. Exp G1’s results at mid-year and Exp G2’s results at final-year testing are referred to as immediate post-test, while Exp G1’s results at final-year testing are referred to as delayed post-test. It was hypothesised that at final
testing, Exp G1 would do significantly better than Exp G2, as their extended time with the metacognitive intervention should have created a deeper awareness of the strategies compared to Exp G2. Contrary to what was anticipated at post-intervention, the results indicated no statistically significant differences between these experimental groups on the JET reading and continuous assessment measures (refer to Tables 7.6; 7.8 and 7.10). Transfer of the metacognitive skills may not have been explicitly apparent in these standardised measures, and therefore the implications of the data obtained from the qualitative measures need to be considered here. It can be argued then that the type of evaluation measures applied may determine the understanding of the outcomes. Further, the six month duration of the intervention, while more than sufficient in relation to the design adopted for the current research, as well as those reported in some studies in the literature, may not have been long enough for the learners to internalise and consolidate these metacognitive skills which were new to them.

The standardised measures (JET and CAS) utilised in this study, examined the application and transfer of the metacognitive strategies but did not record the actual thinking process during the task, while the qualitative data reflected on the experience with the intervention. The standardised measures provided data on reading as well as the cognitive processing performance. Based on their design, these tests do not allow the learners an opportunity to verbalise their thinking processes, except for the planning subtest of the CAS, to a certain extent. This, however, was not indicated in the JET reading test. It may be concluded that the measures utilised were relevant for obtaining quantitative outcomes of reading and cognitive processing, as well as indicating a link between the PASS constructs and the intervention, but may not have been sufficiently suitable to indicate the levels of metacognitive change within the learners following the intervention, that is, they were static in their measurement of the skills. Halpern (1987) indicates that assessing thinking has unique assessment difficulties, describing it as an "amorphous goal" (p.76), as the content taught in thinking programmes is not assessed directly in standardised measures. Assessing thinking specifically is unlike assessing subject content taught, as the content in the subjects evaluates understanding and recall. Halpern (1987) therefore states that the limitations of the various thinking assessment methods must be taken into account when interpreting learner outcomes.
For future research, participants could be asked questions about the strategies they used in formal tests following the completion of such tests. Although there are limitations regarding subjectivity of these methods, and these are acknowledge by Jacob and Paris (1987), Johnson and Onwuegbuzie (2004), and Halpern (1987), among others, qualitative testing can be claimed to be just as relevant as significance testing, especially as the procedures and the processes of qualitative methods can be carefully monitored for reliability and trustworthiness, maintaining rigorous practice (de Wet & Erasmus, 2005).

The types of measures are thus important when considering assessment in future metacognitive intervention studies. The standardised measures used in the current study indicated statistically significant correlations between CAS subtests and the JET reading test, confirming that similar cognitive processes are involved in both skills, supporting Haddad et al.’s (2003) findings that the PASS constructs are relevant for instruction. The qualitative analysis together with the quantitative results provided a deeper appreciation of the learners’ perceptions of the intervention to their learning in this study. Kelly (2007) states that, “qualitative analysis provides a perspective of human experience and is concerned with making sense of human experiences from within the context” (p. 346). Additionally, triangulation of data sources can be used to support the phenomena being studied. Therefore a mixed methods approach was utilised, and is recommended in future intervention studies. The results of each measure at mid-year and final testing times for each experimental group are discussed to substantiate the claim that a mixed methods approach is essential in explaining the learners’ metacognitive experience.

A discussion of within-group performances in the experimental school is presented so that a systematic understanding of each group’s experience in the intervention may be appreciated. Exp G1, who received the intervention within the first six months, was expected to have performed better following the intervention, but their outcomes on the JET reading at mid-year testing (immediate post-intervention) were unexpected, and the lack of improvement in their reading performance, although difficult to understand, may be as a result of several reasons. This group, having just completed the intervention, may have been concerned about their application of the metacognitive strategies and transfer of their learning, making them overly cautious about applying the strategies. From the teacher’s report in qualitative data, some learners in this group were considered academically weak (R. Soodyall, personal communication, 2008), and this
impression may have been conveyed to the learners, hence their caution and seemingly low confidence. This was also implied in the focus group, where they discussed their need for the teacher developing their confidence. This is in addition to performance anxiety in tests. Feuerstein (1979) and Kyriacou (1995) discuss the impact of the self-fulfilling prophecy, indicating that students may perform as expected of them. Therefore, teacher expectations of learners in schools are important motivating factors and influence learner performance.

Additionally, Exp G1 learners could have been complacent about the evaluation, as the standardised tests were familiar, as a result of the baseline testing, and they may not have realised the importance of paying sufficient attention to their performance. This relates to individuals who think that a familiar task does not require focused and sustained attention, as they think they know precisely what to do and thus expend little effort on it. According to Greenberg (2000a, 2005a), this approach indicates ineffectual use of self-regulation, exploration and planning skills, which interfere with successful outcomes, and such learners would require feedback so that they develop an awareness of this ineffective learning behaviour. Furthermore, Exp G1’s slight decrease in reading scores at mid-year (immediate post-intervention) was noticeable, considering that they performed better at baseline, with no intervention at that stage. This may also point to them not having had sufficient time with the metacognitive intervention to refine their meta-strategic knowledge of knowing and understanding their capabilities, and not knowing when and how to apply the metacognitive strategies to their reading tasks. Berger et al. (2008) confirm that students need time to become aware of their learning styles and require additional time to apply strategies, with the insight of when a strategy needs to be replaced.

Given Exp G1’s unexpected outcomes on the JET reading test at mid-year (immediate post-intervention), conclusions drawn at this point, based only on the quantitative results, would not describe the learners’ knowledge and perception of their experience with the metacognitive intervention, and it is therefore useful to examine trends in the qualitative data. Exp G1 indicated positive responses in their mid-year (immediate post-intervention) focus group interview, as they could recall and apply both content-based and metacognitive strategies. In response to the question of what strategies they used in their learning, they replied, “we used ‘self-regulation, planning, exploration and other strategies that we knew’”, and they indicated their appropriate application in tasks including projects and reading. Another learner from this group stated that
the metacognitive strategies assisted him with approaching comprehension tasks, while a different learner said that, "the strategies help in broadening one’s outlook in life". Additionally, a learner said that she used the skills on her own to plan her work, indicating spontaneous application. The learners in this group also indicated that the metacognitive strategies introduced in the intervention assisted in organising their learning, which influenced their performance. For example, one learner said, "it helped organise me"; a second learner stated, "it helped me get better results"; while another learner indicated that he did better in the exams, using self-regulation. The learners in Exp G1’s focus group, at mid-year, reported that their parents were also aware of the metacognitive strategies, and encouraged them to use them for their exams. The following response confirms the use of the metacognitive strategy, as observed by a parent, as one learner said, “My dad noticed how more organised I was in my work”; while another learner from Exp G1 said, “The thinking strategies helped when answering questions in class”. Some learners in this group indicated that they progressed in school, where improvements in some subject performance, which was initially low, had been observed when they applied these metacognitive strategies to their learning. This was confirmed by both the teacher and the primary interventionist, indicating behavioural and academic changes in the learners in Exp G1.

These responses suggest that the metacognitive strategies introduced in the intervention were understood and internalised, and that the learners were aware of applying them appropriately in their learning, and specifically in their June exams. The latter application was confirmed by their teacher. She said that Exp G1’s performance, in particular in the June exams’ reading comprehension, indicated results that were better than the remaining two Grade six classes in the experimental school. The teacher said that, “this class performed better than the other two classes on their comprehension results in the June exam and this is usually not the case. The exam included more inferential questions which are more taxing on the learners.” She also confirmed the primary interventionist’s perception of this group in terms of their change in behaviour, with the statement, “at the beginning of the year Exp G1 had difficulty forming a cohesive group, but that changed and the ethos of this class now showed a willingness to work together”. From the early observations of the teacher and the primary interventionist, Exp G1 seemed to have presented as a group who had difficulty with academic performance and behaviour. Towards the end of the intervention phase, however, promising reports on behaviour and learning were noted. One particular learner in Exp G1, whom the staff were mainly
concerned about because of his disruptive behaviour, performed better in the exams following the intervention. This was unexpected and was confirmed by this learner, who was aware of the change in his behaviour and learning, in the focus group interview. He said that he used self-regulation to monitor his behaviour and thinking, and that he did better in his exam, supporting the teacher’s observation.

Exp G1’s knowledge and awareness of the metacognitive instruction was also evident in the sentence completion tasks, at mid-year (immediate post-intervention) where they were required to define and complete a sentence on effective use of metacognitive strategies. Their application of strategies was noted to be scholastically related, as indicated in Figures 6.1-6.4. Exp G1’s focus on scholastic applications may again reflect the focus expressed earlier that this group may have had concerns with regard to their learning. Their awareness of their teachers’ perceptions of them as a class may have added to their focus on application of the strategies on scholastic tasks. This group’s engagement with the metacognitive intervention nevertheless indicated that they were able to recall the terminology introduced, as evident in the word definition activity, where they achieved 92% for “self-regulation”, 81% for “exploration”, 92% for “planning”, 89% for “selective attention” and 60% for “thought integration” (see Table 7.19). Fewer learners were able to define the more abstract concept of “thought integration”, which resulted in a lower score. The majority of these learners nevertheless were well able to define these concepts accurately, reflecting metalinguistic and meta-strategic knowledge. Recall of the terms used in the intervention may be related to the instruction strategy applied, that is, the skill of analogy, which made it easier to comprehend, store and recall the terms. For example, an analogy of a “magnifying glass” was used in exploration activities, linked to the metacognitive strategy of “exploration through a scholastic task” [italics added] (Greenberg, 2005a). Halpern (1987) indicated that the use of analogy, when introducing new concepts, promotes comprehension as it links new concepts to existing knowledge, and hence enhances recall and application.

Exp G1’s awareness and knowledge of the metacognitive strategies were further observed in the classroom. The teacher reported that these learners frequently applied the metacognitive strategies learnt in the intervention to solve problems, engaging effectively in oral tasks, asking more questions and indicating a focus on what was relevant to reach a goal, more than was observed prior to the intervention. She added furthermore that these learners used the
terminology, that is the names of the blocks of thinking and tools of learning, to describe the metacognitive strategies most of the time, showing an understanding of these strategies (see Table 7.22). Following the intervention, the teacher observed changes in some learners in Exp G1, where they appeared to be less impulsive, took more time to think and seemed to generalise their strategy application to other subjects. Exp G1 was reported to have used “talk alouds”, while doing a task in class, a strategy that parents, gauging from their feedback, were not too aware of. According to Vygotsky (1978), the inner speech that children develop, transforms into planned action and becomes part of the solution in attaining the goal in the task. The individual uses this “talk” to guide themselves through the task, which assists in monitoring their application of learning. “Talk alouds” also allow the individual to work through decontextualised contexts as language and learning become more abstract in the school activities (Owens, 2005, 2010). The use of “talk alouds” by the learners in Exp G1 confirms that they were attempting to monitor their thoughts through language. Moreover, their ability to use this metalinguistic skill indicates their heightened awareness of the metacognitive processes. Hence, the intervention can be assumed to have given the learners a strategy to use their language to make their implicit understanding, explicit.

In addition, the teacher reported that following the intervention, the learners in Exp G1 sometimes considered all possibilities before answering verbal questions, but infrequently applied this strategy to written tasks. This observation is crucial as scholastic achievement in Grade six and higher grades requires attention to both spoken and written tasks, as these language skills occupy most of their learning (Nippold, 1988). This apparent lack of application of the metacognitive strategies to written contexts has implications for transfer of learning. Although transfer of the metacognitive strategies was indicated in their focus group discussions and in their sentence activity tasks, the learners did not seem to indicate application to their written tasks. Shlomo (2001) states that for learners to effect transfer, they would need to see a similarity between the cognitive content of the novel task with that of the practised task, and this he refers to as proximal transfer. The learners in Exp G1 may not have applied metacognitive strategies to written tasks as they may not have recognised the similarity between the cognitive content and that of the reading comprehension tasks, which they worked on during the intervention. However, when the learners in the experimental group discussed different contexts and their demands on cognition, they did indicate that reading and writing may not be as
demanding as oral language tasks, as they have the print to go back to in comparison to oral information, where the pace of processing is different and there is a greater reliance on storage of information in memory. This is discussed again later. Nevertheless, it indicates that these learners were aware of the application of metacognitive strategies in different contexts but may not have realised, due to the length of their exposure to the intervention, that written activities are also complex and require the application of the metacognitive strategies for effective expression. According to Greenberg (2000a, 2005a), application and transfer are not always spontaneous processes and need to be explicitly taught.

Moreover, when engaged in classroom discussions, the learners recall and verbalise their thoughts, as they are focusing on the present, and in decontextualised activities may only recall strategies when reminded to do so; hence the possible lack of spontaneous transfer to reading or writing activities. Two learners, however, implied that they used the strategies themselves, without encouragement. This suggests spontaneous use through internalisation, which could indicate that these strategies may have had inner value for them. Greenberg (2005) maintains that learners, who recognise personal value in any learning experience, display a commitment to the task and work towards successful completion. This, however, was not a frequent occurrence, and was confirmed by the class teacher. She did, however, indicate that although the learners did not always use the concepts introduced in the intervention spontaneously, with reminders they were able to apply them to their class work. This may relate to the duration of the intervention, which may influence transfer and may not have been sufficiently long in this study. Also, transfer is a complex concept, and implicates the individuals’ storage and retrieval of information from the schemas formulated, which influences their cognitive processing (Shlomo, 2001). Additionally, transfer and spontaneous use of metacognitive strategies are associated with contexts; hence it is essential to include the metacognitive content into the curriculum, linking to all subjects rather than creating separate modules for thinking strategy training.

Moreover, the intervention seemed to have encouraged and motivated the learners in Exp G1, which they confirmed in their focus groups. In response to the question on the importance of thinking and the contexts that encouraged thinking, these learners said that they learnt thinking strategies both at home and at school. “Interesting”, stated one learner, as “we learnt to think about our thinking”. These learners seem to indicate awareness and an understanding of
metacognition and its strategies. Despite this perception, Exp G1 learners failed to show statistically significant gains in the formal testing contexts at mid-year (immediate post-intervention). According to Cottrell (2001), students who are anxious don’t learn or consolidate, and may not transfer their learning because of their self-beliefs regarding their competency. She states that until this belief in their abilities changes, only then would improved performance be noted. Furthermore, teachers, who have a positive expectation of their learners, achieve outcomes as this boosts learner motivation (Pfeiffer, Feinberg & Gelber, 1987). This correlates with Feuerstein’s reference to the self-fulfilling prophecy where students perform as expected of them. Borkowski (1992) is of the same opinion that there is a bidirectional relationship between motivation and learning. The question of whether the dip in Exp G1’s performance on the standardised tests at mid-year was related to their levels of motivation and self-belief may be valid if only the quantitative data is explored. The learners’ metacognitive experiences shared in the focus groups and their responses in the sentence tasks add a qualitative dimension to understanding these learners’ metacognitive experiences.

In contrast, the learners in Exp G2, at mid-year, had only regular classroom teaching and no intervention. Their performance in the JET reading indicated no significant gains in their reading performance from baseline to mid-year testing as would be expected, and their results, as evident in Table 7.6, did not change. As this group had not received any intervention at this point, it would seem that their performance was constant, confirming the reports of the teacher who described them as an academically strong group, consistent in their academic performance. However, their responses to application of thinking strategies in the qualitative measures indicated that strategy application depended on the subjects being learnt, and that mathematics, economics management science (EMS) and natural sciences (NS) were perceived by this group as challenging subjects that would require more thinking than the others. They did not think that reading was difficult when compared to the subjects they perceived as more challenging, like mathematics and natural sciences, prior to receiving the intervention. Their responses included, “reading comprehension is not as difficult as the other subjects, also not as interesting”, and “don’t want to think about it”, which confirmed their view that only subjects that are more challenging needed strategy application. It would seem that Exp G2 assumed that reading comprehension was simple and that they coped using their content-based strategies. This may also be related to them being seen by staff at their school as a stronger academic group.
Additionally, in response to the question of who encourages thinking and in what context it is encouraged, the learners in Exp G2 responded as follows: “My home encourages studying for exams”; “Strategies on how to study are given by parents and siblings”; “We are encouraged to revise and read”. These responses indicated that this group did not see the school as an additional context for developing their thinking strategies. The learners in the focus groups were also afforded the opportunity to express their opinions on thinking strategies and the changes that they would like to include in their classroom learning. Exp G2 learners added that their classroom learning needed to include more strategy-focused learning so that they could do better. These learners seemed to provide general responses to questions in the focus group, indicating dialogue on content-based strategy use, specific to reading, and learning in general. Exp G2’s responses in the focus groups thus confirm the effect that a lack of explicit metacognitive instruction has on the language used when discussing thinking and learning experiences. A comparison thus of Exp G2’s responses with those of Exp G1, highlights some issues specific to explicit instruction in relation to the metacognitive intervention. Explicit instruction in metacognition seemed to promote a wider discussion, presenting broader views on strategy use, as observed in learners in Exp G1 at mid-year and which is discussed next.

**Comparison of Exp G1 and Exp G2 at mid-year testing**

The comparison of Exp G1 and Exp G2 was necessary to understand the effects of the explicit metacognitive instruction on their learning experiences. Differences in the experimental groups’ perspectives regarding the thinking process and the learning contexts were indicated, which may relate to the timing of the metacognitive instruction. Explicit teaching of metacognitive strategies, according to Greenberg (2000a, 2005a), is needed for learning to be effective. Moreover, explicit metacognitive instruction creates awareness in learners, who should then be able to verbalise the effects the instruction has on their performance, making their implicit knowledge about cognition evident. This was indicated at mid-year testing, where only Exp G1 had been introduced to the metacognitive intervention. In their focus groups, they were able to talk about the metacognitive intervention in relation to their learning, and specifically in relation to their reading. Exp G1 learners stated, “Yes, at school, we learnt about self-regulation, planning, exploration, and how to navigate through a task”. They also indicated that they were
encouraged to reflect on their thinking and apply the new strategies across school subjects. Learners in Exp G1 also said, “You can use it in all subjects”; “We learnt how to use it with reading, can use it with Maths, word problems or when doing a project”.

The learners in Exp G1 seemed to have a different perspective on reading following the intervention and indicated benefitting from the intervention, as noted in their responses. One learner said, “Yes, I see it (the reading) better, helps with organising ourselves; it helped my comprehension”. These responses confirm studies by Cébe and Paour (2000), Conway and Hopton, (2000), Haddad et al. (2003), Marsha and Camahalan (2006), and Eilers and Pinkley (2006), that metacognition instruction impacts positively on reading. A study by Marsha and Camahalan (2006) looked at the effects of metacognitive intervention on reading in four children with dyslexia in a single-case quasi-experimental design. Observations were conducted before and after the intervention phase, and the intervention was provided for a month. The post-intervention testing indicated improved reading comprehension scores for all four children. Their results confirmed that these students with dyslexia were able to achieve their goals, following the intervention. Details of these and other studies are discussed in chapter 5.

Moreover, Exp G1, at mid-year testing (immediate post-intervention), indicated that these metacognitive strategies allowed them to be more alert to other possibilities for their application, i.e. transferability to other learning areas. This may suggest that learner perceptions of classroom instruction influence how they rate the difficulty of subjects taught, especially reading, as indicated earlier, where Exp G1 following the metacognitive instruction were able to evaluate their application. Explicit instruction in the metacognitive intervention may have also influenced the motivation levels within this group, as described in the changes observed by their teacher and the primary interventionist. Continho et al. (2005) indicated that learners who have a greater need for cognition, which refers to the intrinsic motivation within the learner, and enjoy the challenge appear to do better than those who don’t have this level of motivation. These standpoints on reading and thinking therefore have implications for instruction in the classroom with regard to approaching the task of reading, which is fundamental for academic success and life-long learning.

Furthermore, the discussion on applying strategies to different contexts indicated that learners in Exp G2 saw only subjects that were more challenging as needing strategy application, whilst
learners in Exp G1, following the intervention, saw the application of the metacognitive strategies as being useful across subjects, irrespective of their level of difficulty. This wider generalisation in the latter group’s response reflects the principle of bridging, which was included in the intervention. Bridging or transference, as formulated by Greenberg (2000a) and Feuerstein et al. (1980) respectively, is essential for application of the learning to other situations. Through this process, the learner is able to transcend the content and apply the process in a different context. Greenberg (2000a, 2005a) agrees that creating links between the classroom learning and other contexts, hence the term bridging, enhances independence within the learner. It also reinforces Vygotsky’s (1934/1987) notion of the development of psychological processes, where the learner transfers learning that has been internalised and understood. It is important to bear in mind that, even though reading was the main focus of transfer and application in the present study, bridging to other contexts was also included. Haywood (1977) maintains that cognitive instruction must link to all learning contexts as spontaneous learning may be insufficient for some learners. Haywood (2008) also emphasises that teaching thinking for transfer is important and must be considered in metacognitive and cognitive interventions.

The comparison therefore between Exp G1 who had received the intervention and Exp G2, who had not, indicates that explicit instruction appears to promote the ability of the learners to use their metalinguistic skills to talk about the intervention in relation to reading. Explicit instruction also indicates that using the terminology in their explanations and in their reflections on their learning, builds meta-strategic knowledge (Greenberg, 2000a, 2005a). Joseph (2006) reiterates that metacognitive strategies allow learners to reflect on their cognitive processing, which permits them to use their academic strengths to develop additional skills, progressing towards intellectual maturity. Explicit instruction also appeared to promote broader perspectives on when and where to apply their strategies. Exp G1 saw the application of the thinking strategies as being wider than just for use within the classroom. This perspective on explicit instruction of metacognition seems to be related to the intervention introduced, as Exp G2 also indicated such changes in their use of metalinguistic skills and in their understanding of metacognition, following the intervention phase. This is discussed in the next section where comparisons between the experimental groups, following their respective intervention phases (immediate post-intervention) are described.
Comparison between immediate post-test of Exp G1 (mid-year) and immediate post-test of Exp G2 (final year)

Exp G2’s reading performance in the JET reading, at final testing (immediate post-test) also indicated no statistically significant gains. This mirrors the findings observed in Exp G1 at mid-year testing (immediate post-test). It seems that, when tested immediately after the intervention, the groups do not show the gains anticipated which could be as a result of insufficient exposure to the intervention and time to consolidate and apply their learning to various test contexts. Length of exposure to the intervention is a major factor, which relates to transfer and has a substantial influence on learner performance. Duration and length of exposure to the intervention were also cited as limitations in the Conway and Hopton (2000) study, where they stated that although the learners in their study showed significant gains in academic tasks, perception of ability and planning tasks, following a problem-based instruction (PBI), metacognitive intervention given by their teacher for six months may not have been sufficiently long to encourage changes in teacher behaviour and learner performance. Haywood (2008) indicates that the significant effect of time and the length of exposure to the intervention are important for effective learning. He suggests that the gains identified at post-test are proportionally related to the amount of time of inclusion in a cognitive programme in the classroom. He estimates that 75 to 100 hours produce significant gains in cognitive development and scholastic areas. Haywood (2008) alludes to consistency and for teachers to engage in sufficient mediation of the metacognitive and cognitive input for transfer to be effective. In addition, Feuerstein and Falik (2010) recommended three to five hours per week for the Feuerstein Instrumental Enrichment (FIE) programme in their study. Büchel (2007 cited in Berger et al., 2008) also confirms that the length of time is critical and should be an absolute condition for successful learning, maintenance and transfer. The groups in the experimental school in the current study, were given the intervention fortnightly, with 16 sessions within each semester, tallying to eight hours of explicit metacognitive instruction per class group, and then lessons followed through by the class teacher for the remaining part of the year. More time and monitoring over longer periods may be suggested, and the lack of this could be seen as a limitation of this study. However, educational contextual constraints in this study had to be considered, as this was a field study carried out
within the confines of the scope and demands of a regular school system. Therefore, duration and
domain specific content, linking the intervention to the curriculum, as well as the teacher as an
effective mediator, may have implications for future metacognitive intervention research and
educational pedagogy.

The reference to the length of the intervention was also implicated in the learners’ discussion of
how thinking could be encouraged further, as indicated in the third theme of “evaluations and
opinions on metacognitive instruction” (refer to Table 7.20). The learners stated that thinking
strategies should be ongoing and that they need to engage in thinking skills more frequently,
which should be introduced in earlier grades so that the learners would be familiar with them.
The learners’ responses from the experimental groups implied that strategy-based learning would
help them reach their future goals and especially be of benefit in demanding academic
programmes. This discussion indicated that the participants seemed more aware, post-
intervention, of the influence these metacognitive strategies seemed to have had on their
learning, especially as they approach higher grades, but that a longer experience with the
metacognitive strategies was necessary for them to make it part of their learning. This has
implications for consolidation of learning, as they were also aware that different demands are
indicated by the level of task.

The duration and exposure to the intervention also appeared to influence the learning of the
terminology introduced in this intervention study. The learners in the focus groups, post-
intervention, reported that the names or the terms that were introduced in the metacognitive
intervention were not always easy to recall, and that they needed a longer time in the process in
order to own their learning, as these terms were not part of their regular vocabulary. From the
parent responses it was also noted that the parents were not explicit in their use of the
metacognitive strategy names. For example, one parent said that the child considered a variety of
possibilities when given a task, without using the term “exploration”, even though “fridge pages”
with the definition of the terms were provided to the families during the intervention period
(Greenberg, 2000c, 2005c). This may be as a result of parents, teachers and the learners not
being fully aware of the importance of using the metacognitive language for metastrategic
knowledge development. Greenberg (2000a, 2005a) proposes that names of the metacognitive
strategies be used in the lesson, as the use of the language and the terminology are fundamental
for metastrategic development of knowledge, which impacts on application. This further links to the concept of family school partnerships discussed next.

Greenberg (2000c, 2005c) highlights the importance of the partnership between the home and school context in the promotion of metacognition in learning. From the focus group interviews in this study, it was evident that the learners from both experimental groups, following their exposure to the metacognitive intervention at final testing, changed their perception of the contexts of where mediation of thinking occurred. Once they were made aware of metacognition, they then saw that thinking strategies were being encouraged by both their school and their homes. It was interesting to note that some learners shared information learnt in the intervention with parents as they reported that their parents would use it when helping them. Others didn’t do so, and one learner from the group implied that his parents were too busy and did not always show the interest that the learner expected. As discussed in the method chapter, the process of the intervention in this study encouraged family and school partnership, where a fridge page (Appendix X), which defined the CEA metacognitive strategy, was sent home fortnightly for the duration of the intervention, in addition to the parent meetings at the commencement of the study. This was crucial, as Greenberg (2005a) indicates that a shared vocabulary in the language used would teach learners “how to learn” (p. 3). This shared learning would also encourage the family and the teachers to be part of the learning process so that the terminology introduced would consolidate; and generalisation would be encouraged and effective transfer achieved, as explicit reference to metacognitive and metastrategic knowledge is constantly developed to encourage lifelong learning. Greenberg (2005c) states that “school and family partnerships acknowledge the critical importance of personal worldviews and cultural beliefs in the development of an individual’s learning potential” (p. 2). Additionally, teacher training workshops were suggested by the learners as they felt that their teachers could encourage metacognitive strategies and this would impact on their learning. This alludes to the points reiterated above by Greenberg (2000c, 2005c). The awareness among the learners, teachers and parents is therefore an essential cornerstone for further extension of the metacognitive intervention strategies, thereby creating an environment conducive for effective transfer.
The lack of statistically significant results at immediate post-intervention testing adds a further dimension to the novice-to-expert continuum, as discussed in chapter 4 (teaching and learning) and chapter 5 (intervention), where learners are considered as novices if they have been recently introduced to the intervention. Time, length of exposure and transfer are linked to levels of novice versus expert, and are issues that emerge frequently, and are discussed by researchers including Halpern (1987), Flavell (1987), and Shlomo (2001). Halpern (1987) maintains that the distinction between novice and expert relates to how information is processed and stored in their schema. The novice thinker may have less differentiated and less sophisticated storage of these thinking strategies and conceptual knowledge in their schema, which is in contrast to the expert problem-solver, who has complex representation or schema (Halpern, 1987). Furthermore, only with sufficient time and practice can the learners develop mastery. According to Flavell (1987), the less mature or novice students do not know how to show their appreciation of the significance and the implications of their metacognitive experiences, and that metacognition can only improve with practice. The duration of the intervention and practice continue to be indicated as essential in achieving transfer (Feuerstein & Falik, 2010; Haywood, 2008). The length of exposure to the intervention in the current study may thus be considered as a limitation. However, the cross-over design intervention prevented a longer time period being devoted to the intervention, as the study took place within a natural context. Length of exposure to the intervention has implications for teacher pedagogy insofar as metacognition needs to be consistently explicit in its implementation and should form an integral part of the curriculum.

When examining performance at immediate post-test, a factor in addition to length of exposure to the intervention is cognitive variability among learners. Siegler (2007) indicates that cognitive variability within each learner across testing times as well as within each testing time cannot be ruled out, and this may therefore also have influenced the results of the study. He adds that cognitive variability occurs not only at the biological levels in terms of neural associations but also at the level of strategy application, and other higher level cognition. Variability in cognitive development is essential to understanding cognitive changes and, according to Siegler (1994, 2007), should not be discarded but rather explored, as it may be through this process that
enhanced learning and consolidation and transfer may occur, and not just through repeated practice.

Another aspect to consider that could have influenced the absence of significant change in Exp G2’s performance on the JET reading at immediate post-intervention could be related to resource allocation. Exp G2, who were reported as the stronger academic group, may not have considered themselves as a group with a high need for learning about metacognition during and after the intervention. Although their levels of motivation cannot be judged, their responses were not overwhelmingly indicative of reading being a great challenge, as they may have thought that they cope well in class, irrespective of any input. This was also conveyed by the teacher who did not see major shifts in their performance following the intervention. Wittwer and Renkl (2008) indicate that instruction that may appear or be perceived as easy, results in the information being classified redundant. Such redundant information distracts the cognitive resources from processing more elaborate information that directly fosters learning. Therefore, factors relating to the individual learners, as well as the intervention design, could have influenced their outcomes on the standardised tests. Qualitative data thus need to be included in the understanding of learner performance and experience.

Furthermore, Exp G2’s responses in the focus group at immediate post-intervention testing implied a change in their perception, and they said that the metacognitive strategies introduced in the intervention need to be ongoing. They saw academic demands in higher grades as benefitting from this input and that they would need to be prepared for future grades. One learner in this group said, “Yes, next year the work is more demanding and we need to work towards high school”. Another learner stated, “To reach our goals, to practise thinking for next year and for the future”. This adds to the argument that once metacognition is explicit in its instruction, learners should be able to reflect on their thinking and evaluate it.

This was evident following the intervention, where both experimental groups were able to define concepts in the sentence completion tasks (Table 7.19). These were conducted immediate post-test, at mid-year for Exp G1 and at the end of the year for Exp G2. Self-regulation, exploration and planning required the learners to understand how to approach a learning experience, explore what is required in any given task, systematically search for information needed, select relevant information and, depending on the goal of the activity, to systematically organise the information.
gathered, follow appropriate procedures and anticipate changes so that the necessary shift could be made (Greenberg, 2005a). Additionally, the metacognitive strategies of “selective attention and thought integration” required the learners to attend to the goal and to focus on relevant information, while processing the information simultaneously and sequentially (Greenberg, 2005a). The metacognitive strategies helped the learners to reduce distractions and to focus on the reading task at hand, as well as respond in a regulated manner rather than impulsively, when answering the comprehension questions. The learners in Exp G1 seemed to have expressed better understanding of metacognitive strategies of “exploration and planning” than those in Exp G2 (Table 7.19). It can be seen that even though Exp G1 used less articulated thought and sentence expression, the majority of this group indicated an understanding of how to approach the learning experience, achieving 78% and 90% in the exploration and planning strategy respectively. These strategies of approaching a learning experience seemed to have resonated better with Exp G1 learners, who were described by their teacher as less attentive and more disorganised than learners in Exp G2, as they assisted Exp G1 learners in applying more control over their learning.

Learners from Exp G1 seemed to have had more difficulty in expressing the definitions and their understanding of “selective attention and thought integration”, when compared to learners from Exp G2. A large portion of the Exp G1 learners responded incorrectly or produced no response to the definition requirement for “thought integration”. This may suggest a possible misunderstanding of these abstract concepts in their knowledge base, in addition to a probable poor linguistic expression, indicating their learning ability, which alludes to their teacher’s perception of this class being weaker academically than Exp G2. According to Marsha and Camahalan (2006), “metacognition helps regulate the flow of information through the working memory and as indicated by the information processing theory, monitoring of this processing is critical due to the limited capacity of the working memory” (pp. 80-81). As metacognitive strategies facilitate easier transition through the limited capacity of working memory, it was assumed that Exp G1 would have applied their metacognitive strategy of selective attention and thought integration more effectively in a more complex task when expressing the definitions.

From the parent comments, following the intervention (Table 7.21), it was implied that their children seem to show better use of selective attention, where they focused on what was relevant
to reach a goal, such as in planning and completing a project. This is indicated in the response of one parent regarding his son and who said, “He carefully considers what is required of him, does research and does the task at hand, to the best of his ability”. The skills required in applying an understanding of selective attention and thought integration are, however, not automatic processes for all learners, and explicit instruction is necessary in addition to the length of exposure to the metacognitive strategy for consolidation and application (Greenberg, 2005a; Shlomo, 2001).

The learners in Exp G2, in contrast to those in Exp G1, seemed to display different levels of cognitive processing and worldviews. This was evident in their linguistic ability as indicated in the complexity of their sentence structure when defining these metacognitive strategies, and may also be reflective of their academic performance (Table 7.19). Exp G2 was described as a stronger academic group by the class teacher, as their academic performance and their language abilities, which are necessary skills for reading, were reportedly good (R. Soodyall, personal communication, 2008). It was therefore expected that learners in Exp G2 would have done better in their reading performance in the JET reading test, post-intervention. This, however, was not the case, and Exp G2 showed less transfer of the effects of the intervention, especially in the quantitative measures and in the teacher’s reported observations of this class’ performance, post-intervention. These results are discussed further in the next section. Additionally, these results demonstrated the benefits of using a triangulation of methods, such as the mixed methods approach, as any one method would only tap into certain cognitive skills, and certain details may thus be lost in the process.

**Final testing: Comparing baseline to final performance, post-intervention**

At final testing, Exp G1 (delayed post-intervention) and Exp G2 (immediate post-intervention) were again compared. Exp G1 had received the intervention in the first six months of the year and regular teaching in the second six months. Exp G2 had regular teaching in the first six months and the intervention in the second six months. Maturation and history factors can be assumed to have been operational for both groups, even though a repeated measures design was utilised to control for these factors, hence the outcomes must be understood in light of this.
A marginal difference in means between Exp G1’s baseline and final performance was indicated on the JET reading test, but the result was not statistically significant (Table 7.7). The teacher, however, was of the opinion that there had been a positive change in performance following the intervention and she reported that learners in Exp G1 demonstrated differences in their academic outcomes and in their behaviour (R. Soodyall, personal communication, 2008). The observed improvements were described as a change in their awareness of reflecting on their thinking, as indicated in the qualitative data. Nevertheless, the hypothesis that the group which received the intervention in the first six months would perform better than the second experimental group, as well as when compared to the control school, is still rejected on the grounds of an absence of statistical significance in the quantititative data.

Although Exp G2 obtained slightly higher reading scores from pre- to mid-year to final testing, no significant impact of the intervention was evident, post-intervention. They did not perform at final testing as expected, based on their scholastic reports and their teacher’s perception of them as a class. The teacher reported that Exp G2’s response to the intervention was difficult to explore as the programme was implemented in the second term, which had several other activities, but that she expected this group, who appeared to be academically strong, to have shown significant changes in their processing, post-intervention. Nevertheless, she added that the learners from Exp G1 seemed to have responded better to the intervention than those in Exp G2. From the earlier discussion, it can be understood that Exp G2’s unchanged performance may have also been due to the duration of the intervention, as well as in their spontaneous application of strategies, immediately post-intervention. It would have been interesting for Exp G2 to have been reassessed six months later to determine their performance at delayed post-testing and to compare this to the results of Exp G1.

Although this may seem to be a methodological limitation, the present study’s intervention design was structured to commence and be completed within the timeframe of the school year. Haddad et al. (2003) indicated a similar limitation in their research, which investigated whether planned instruction (PI) would benefit reading comprehension, depending on the PASS cognitive characteristics of 45 fourth graders from general education classes. The details of this study were presented in a previous section and in chapter 5. The teacher conducted a cognitive strategy intervention for an hour over two consecutive days, following pretesting of reading
comprehension. The comprehension results at post-test indicated that the children who had poor planning scores benefited most from the PI than those with no CAS weaknesses or those who had a CAS weakness in successive processing, again confirming that the PASS profiles are relevant to adjusting the instruction. However, the Haddad et al. (2003) study did not examine gains at delayed post-intervention, reporting it as a limitation. Duration of an intervention as a limitation was similar to the Conway and Hopton (2000) study, mentioned earlier. It is understandable that the length of exposure to the intervention adds to consolidation of understanding of the strategies, as well as to spontaneous recall and application, therefore future studies should include measures at delayed post-test.

The expectation that learners in Exp G2 would perform better in their reading post-intervention could not be confirmed from the quantitative results. They showed some improvements from baseline to final testing, but their gains at final testing in comparison to Exp G1 were nonetheless lower and not significant (Table 7.6) and this was confirmed by the teacher’s comments as mentioned previously. Gains made by low performers may be more evident because the margin from baseline to final testing is greater, as seen in the current study, and changes may be less apparent for the stronger performers, as there is a smaller margin for improvement. It may be beneficial to examine individual learners who have poorer performance at baseline, and following the intervention, track their changes. This would be similar to Naglieri and Johnson’s (2000) concept of ATI, which relates to an intervention based on an individual’s particular aptitude and associates with domain-specific contexts. This was reported in the studies by Naglieri and colleagues, where improvements in planning skills on the CAS were achieved by children with poor scores in planning when compared to children with good planning, following the intervention that focused specifically on planning. They argue that learners who display less than adequate performance in any particular area of cognitive processing would benefit from a related intervention, as reported in their studies.

From the outcomes at final testing, there was no overall difference in performance between Exp G1 and Exp G2. Qualitatively, Exp G1 showed that they were more aware and had a longer engagement with the awareness of their metacognition, as indicated in their responses in the focus groups (Table 7.20). Jacob and Paris (1987) stated that children’s awareness about reading
and their use of effective strategies can be promoted through instruction, as indicated in their team study, which utilised an index of reading awareness to evaluate metacognition on reading. They concluded that a classroom-based programme on metacognitive instruction created greater reading awareness among the fifth graders than among the third graders in their study. This supports the findings of the present study in that the metacognitive intervention encouraged an awareness of how to approach the reading task and plan the use of strategies that would assist in the activity. Increasing awareness also results in improved performance as individuals often have a misconception of their abilities. Campione (1987) mentions that previous studies had an “overriding emphasis on making learners aware of themselves, and the availability and the potential use of cognitive resources” (p.137). Jacobs and Paris (1987) understand cognitive awareness as part of self-management in the learner, where this is a prerequisite for reflection, monitoring and evaluation to develop.

Although, the pre- and post-intervention performance of the experimental groups on the quantitative measures was not statistically significant, the learners with the longer exposure, as well as learners in the experimental school, appeared to be positively aware of the influence the metacognitive instruction had on their learning, as indicated in their focus groups’ responses. Their knowledge and awareness was further evident in the thematic content analysis of the second content theme, namely “understanding strategies”, where their ability in defining the metacognitive strategies introduced in the intervention was evident. This immediate post-test measure, for both experimental groups, indicated their metalinguistic skills, and confirmed their metacognitive knowledge and skills in relation to what they had learnt and understood in the intervention. The experimental groups’ awareness was also indicated in their parents’ and teacher’s feedback. Parent reports indicated that these learners could describe and apply the strategies they had learnt most of the time. This supports the argument that explicit metacognitive instruction influences firstly the levels of awareness, and then knowledge and application of strategies.

The learners in both experimental groups were able to select relevant contexts when applying these metacognitive strategies, as indicated in the sentence completion tasks (Figures 6.1- 6.4), in their project application, timetable scheduling and organisation, as well as indicated in their parents’ responses, immediate post-intervention. One parent described his son as “being very
thorough in planning his studying for exams. He does time planning and knows what needs to be learnt, and is organised and does the learning according to the schedule.” Moreover, parents indicated that their children’s thinking was reflected in contexts, relating to relationships and responsibilities that they encounter at home and at school. The parents seem to be aware of the application of metacognitive strategies although they may not have realised the extent of the transfer or the impact of the metacognitive education, as reflected in the next statement. One parent indicated that, despite not being too familiar with the programme, her child had achieved better results in her scholastic performance in the last few months than ever before.

Furthermore, application skills in the sentence completion activity were indicated, as mentioned, and Exp G2 seemed to have chosen interesting and diverse situations, for example, arguments, decision-making and relationships. This may be reflective of these learners’ wider worldview, which links to their knowledge base. The use of the knowledge base is central to thinking when reading, according to Das (2001). The application of the metacognitive strategies for most learners, especially Exp G1, was more narrowly focused on school-related content, perhaps indicating that choices may be related to what the learners were involved in around the time of the intervention. The choice of exam application was evident in Exp G1’s responses, who may have been more concerned about their scholastic performance than Exp G2 learners, who were reportedly a stronger group, academically. This is also interesting, as the teacher confirmed that Exp G1 performed better than the other groups in their mid-year language examination. It can be argued that generally the learners from Exp G1, who seemed more anxious about their scholastic performance, may have benefitted from the metacognitive intervention and showed levels of noticeable improvement. Awareness of the metacognitive strategies is therefore important in promoting application and generalisation to other learning contexts, as learners become consciously active in their participation with the task, which is supported by Marsha and Camahalan’s (2006) in their discussion on metacognition. Moreover, Haywood (2003) states that it is this awareness and the need to know, which creates cognitive conflict in the individual, ultimately leading to cognitive development.

Despite the preceding argument on learner awareness, both experimental groups did not seem to apply their understanding of the metacognitive strategies sufficiently in the standardised tests to
any greater statistical effect. This may be indicative of the learners not spontaneously
generalising their learning to other learning situations or assessment contexts at this time. The
skill and the extent of transfer is implied where learners may have understood the principles of
the metacognitive strategies and were able to recall appropriate schema in the word definition
tasks, described in Table 7.19, but may have been unable to apply them to solve the particular
tasks in the JET reading test, hence the absence of statistically significant results. Shlomo (2001)
emphasises that transfer to tasks with similar cognitive content to the metacognitive tasks
introduced, is easier but transfer to less similar tasks may be more difficult, including school
subject matter, and may require more time and practice with the metacognitive strategies. This
reference to the duration and exposure to an intervention needs to be considered in future studies,
where original tasks in the intervention need to become part of the learners’ schemas. This point
was also alluded to by the learners in their focus group interviews, where the learners from Exp
G2 said, “Need to start early in preschool so that it becomes part of our learning”. Another
learner in Exp G2 said, “Keep the thinking skills more frequent, ongoing review; revise at the
beginning of the new year, so that it will assist in our learning”. Haywood (2008) reiterates that a
longer period of engagement with these concepts, as indicated in an earlier discussion, is
essential so that concepts can be consolidated, as their effect on the learning process is
fundamental. In addition, transfer may also have been influenced by classroom instruction,
where assessment generally focuses on content and may not include explicit reflection on the
cognitive process. It is possible that the learners automatically reverted to responding to content
when the standardised tests were carried out, giving little attention to the process. Conway and
Hopton (2000) indicate that the learners in their study may also not have perceived a link
between the skills they had developed following the PBI intervention and the assessment tasks.
Explicit metacognitive intervention therefore should include making learners alert to links
between academic and assessment tasks, without necessarily implicating practice effects.

Exp G1 and Exp G2 commenced with the intervention from approximately similar levels and
received the same intervention. Given this, it is possible that the more capable learners
performed better, based on the qualitative analysis, in their outcomes than the other group. This
suggests that Exp G1 may be a class with potential that may not have been realised due to the
school’s perception based on their behaviour. The teacher’s initial report of this class, regarding
their behaviour, and academic performance, is salient as her initial feedback does not appear congruent with the changed performance observed in this group, post-intervention. Exp G1 learners’ responses indicated a positive change in perception of a class that the staff were initially very concerned about, and this was clearly articulated by the teacher and the primary interventionist in their comments (P. Nilsson & R. Soodyall, personal communication, 2008). Although the metacognitive intervention may not specifically be implicated in the outcomes of these learners, owing to the absence of statistical significance in the quantitative results, it is important to note that the awareness expressed in the qualitative results by the learners, the parents and the teacher, indicate a shift in mind-set to learning; and that they generally identified the changes as being linked to the metacognitive intervention. This points to the importance of considering both quantitative and qualitative data sources, as they together provide a broader view on the learners’ performance and metacognitive experiences.

8.3 Comparisons of Cognitive Processing between the Experimental and Control Schools

The cognitive processing between the experimental and the control schools, as assessed on the CAS, indicated no statistically significant difference between these groups at baseline, implying that they were comparable in their cognitive processing skills. This is important as matching was not used and the groups were non-equivalent (Tredoux & Smith, 2007). In terms of the ANOVA results, the interaction between group and time indicated that both the experimental and the control schools performed similarly, with no significant difference in their degree of improvement on the subtests of the CAS, across the three measurement times (Table 7.13). This suggests that the intervention made no statistically significant difference to the cognitive functioning of the experimental groups. The lack of statistical significance at post-test in the overall cognitive performance between the schools may be a result of individual differences in the learners or the sample size, as mentioned earlier. Therefore transfer effects of the metacognitive strategies may be better understood in the trends revealed in the qualitative data.

The experimental school did perform differently to the control school at mid-year and final testing, and this was evident when the CAS subtests were analysed individually. The
experimental school showed significantly better performance in the planning \( F(2.80) = 6.89, \ p< 0.001 \) and the successive \( F(2.80) = 6.36, \ p<0.003 \) subtests of the CAS than the control school. The learners in the experimental school were introduced to planning and thought integration, which involved successive and simultaneous processing as part of the intervention. The intervention, however, was not based on an ATI framework, as all learners, irrespective of their initial cognitive performance, received the same intervention. Although no conclusions can be drawn regarding the intervention, as the interaction between group and time was not statistically significant, the trends observed in the cognitive processing performance of the experimental school can be considered together with the themes identified in the qualitative data.

Furthermore, the experimental and the control school’s cognitive processing scores, as indicated in Table 7.14, showed an increase across the subtests, consistently over time. These subtests (planning, simultaneous, attention and successive) are all highly correlated with reading (Das, 2001; Reid et al., 2002). The significant correlations between the CAS (planning and successive subtests) and the JET reading test in this study support this. The experimental group of school learners who had received the metacognitive intervention (specifically, planning, exploration, thought integration, self-regulation and selective attention) may have transferred these skills, giving them an advantage over the learners from the control school. The learners in the experimental school may have been aware of and recognised the principles of the metacognitive strategies, and attempted applying them, hence the slight differences. However, effective transfer of metacognitive skills for success appears to require considerable time and more practice than the learners had available to them (Shlomo, 2001). The responses of the experimental group of school learners on the qualitative measures provide further insight into their experience.

8.3.1 Comparisons of cognitive processing between and within the experimental groups

Exp G1 and Exp G2 showed improved cognitive processing over the three testing times, when their results across all the subtests of the CAS were examined (Table 7.12). Exp G1’s improvements in the planning and the successive processing subtests were marginally better than those of Exp G2 at mid-year and final testing. Chow and Skuy (1999), and Das (2001) indicate that planning and successive processing are involved in reading, as shown in their studies as
discussed in previous and subsequent sections. Associations between the processes in the JET reading test and the CAS subtests were examined (Table 7.16), and the majority of the subtests indicated a weak to moderate correlation, partially supporting the assumption that similar processes exist in these skills.

Exp G1, who were reported as academically weaker than Exp G2 by their class teacher, may have benefitted more from the intervention than the quantitative results actually show. This was suggested in the focus group discussion, where Exp G1 learners' responses, based on their application of the metacognitive strategies, reflected a deeper insight than the learners from Exp G2. In response to the question on the importance of thinking strategies in relation to their learning, Exp G1 learners discussed and reflected on their thinking processes. They used the terminology covered in the intervention and could explain how it helped them to work through a task. The teacher reported that Exp G1 responded more positively, following the intervention, with changes in their academic performance and in their behaviour, than the learners in Exp G2. These responses, together with those indicated in the previous section, suggest that when explicit instruction of metacognitive strategies are included, the learners used the language encouraged in the intervention, as well as displayed a wider understanding of how to approach tasks. Greenberg (2005a) supports explicit instruction in metacognition as being essential for learners to engage actively, allowing them to develop concepts required for higher-order learning. This is further confirmed by Marsha and Camahalan (2006), who state that when metacognitive strategies are explicit, learners apply this learning to their work, and cope with their scholastic activities, as indicated in their study with dyslexic students who showed improved reading scores following the intervention.

Hay (2000) describes such approaches as being structured, but it can be argued that learners need the organisation or structure in order to apply the strategies effectively. Exp G1, who received the intervention in the first six months of the calendar year, seemed to be more metacognitively aware than Exp G2, and expressed their application better, as indicated in their June exams, as well as in their ability to talk about their thinking processes. A learner in Exp G1 said, “You use strategies for life”, which implies that this learner perceived the metacognitive strategies taught as not only applicable to reading or learning in the classroom but to deal with everyday life situations. It confirms Greenberg’s (2000) view that education should aim to develop lifelong
learners. Other learners in Exp G1 also indicated that the strategies assisted in organising their learning and influenced their performance, e.g. “It helped organise me”; another learner said, “It helped me get better results”. “Interesting”, stated one learner, as “we learnt to think about our thinking”. The parents also reported differences in their children’s approaches to activities (see Table 7.21). One learner from Exp G1 said, “My dad noticed how more organised, I was in my work”. From the parents’ comments, it was indicated that application of strategies was evident especially in preparation for exams. The learners in both experimental groups, post-intervention, were described by their parents and their teacher as being more structured, organised and planning ahead for the examinations. These responses support the proposal that reflection on the process of planning assists in learning.

The classroom context also presents different learning paradigms, including collaborative group work, which influences the instruction presented and the type of cognitive processing, depending on the level of the tasks. The learners in both experimental groups, at final testing, reiterated that different contexts placed different demands on their cognitive processing and therefore implicated their metacognitive application. They mentioned that collaborative group activities during the intervention allowed more opportunities to reflect on their thinking, promoting verbalisation of thoughts, making implicit knowledge explicit. These learners indicated that in group activities, they could clarify their thinking, resulting in better understanding and reflection of thought. Verbalisation was encouraged in the intervention as it was important for the learners to be active participants in the learning process. Naremore et al. (1995) maintain that negotiating meaning is the hallmark of conversation; therefore learners must be afforded the opportunity to engage in dialogue when constructing meaning thereby improving their comprehension.

Although the OBE system in South Africa encourages group work, limited verbal interaction in class groups was reported by the learners. Group work promotes Vygotsky’s social learning theory and also highlights the interdependency in effective learning. Vygotsky (1978) indicated that the psychological tools develop firstly in interpersonal situations before they can be internalised for development. The learners were aware that through discussions in groups, new ideas were stimulated which encouraged thinking. Furthermore, group discussions support Vygotsky’s language assumptions that language is activating, social and instructional in nature, which would thus assist individuals to plan and organise their learning.
The learners in the experimental groups also suggested that the metacognitive intervention provided opportunities for them to verbalise their thoughts regarding their learning, which has implications for classroom instruction and learning through discussion, and were discussed in chapter 4 (Renkl, 2002). The learners, in response to the question on thinking in different contexts, made reference to oral conversation being faster than written text, which can be re-read, indicating that they recognised the need to apply quick thinking in conversation, where they need to adapt to the different topics that arise in conversations. Effective pragmatic skills are necessary and work in tandem with cognitive processing so that communication breakdowns are reduced. These learner responses therefore provide insight into their awareness that different contexts place different demands on their cognitive processes. This supports the significant associations between the CAS and the JET reading test, where different requirements in the reading questions tapped into different cognitive processes. The metacognitive instruction in this study therefore appeared to encourage active group participation, which impacts on the learner’s mental processes and ultimately on outcomes. Greenberg (2005a) argues that the metacognitive instruction, however, needs to be in the ZPD, challenging, motivating and providing guidance, developing lifelong learners.

The type of instruction emerged frequently in the focus groups’ discussion at final testing, as these learners seemed to indicate that the metacognitive intervention allowed for greater expression of opinions and encouraged broader perspective-taking. The learners indicated that they felt restricted by traditional teaching methods, as conventional methods do not encourage them to express their points of view, which is an essential avenue for clarifying their thinking. The learners suggested, “if we were allowed to share our opinions and make a verbal contribution, we would create a class of acceptance, without feeling ignored”. Renkl (2002) states that learners and the teacher must engage actively in verbalisation and discussions for construction of meaning and for effective learning in a metacognitive instruction approach. Sharing of information is associated with interdependency between the mediator and the mediatee at both a cognitive and an affective level, enhancing collaborative learning and active participation (Greenberg, 2005a). Additionally, for verbal discussions to be effective, reciprocity, which refers to the rapport between the teacher and the learner when engaging in learning, is essential (Feuerstein et al., 1980). Tzuriel and Eran (1990) indicate that reciprocity must be
included with intentionality, which refers to the intentional selecting and framing of specific stimuli, so that the mediator actively focuses the child’s attention on the stimuli for a change in perception and processing. This is critical for MLE to be effective.

Furthermore, the learners indicated that they wanted to be more actively involved in their learning, to be part of the process and to decide on how they could recall the terminology used in the metacognitive instruction. For example, a learner, in response to being asked about the terminology, said, “using rhymes so that the names could be easier to recall, as well as in personalising the posters on the metacognitive strategies”. The learners suggested that reviews at the start of the year and a more visual display of the CEA blocks and tools covered in the metacognitive intervention programme would assist them in recall and retrieval of the strategies learnt. Visual displays were included, but they were probably not referred to in the class sufficiently, and therefore active learner involvement is suggested for future implementation. This indicates that learners were eager to participate in their learning, reflecting motivation and an attitude of wanting to engage in the process of instruction and learning. The classroom environment is thus fundamental in creating a context that promotes learning.

The classroom context was also implicated when parents and the teacher were asked about the use of questions by the learners. There were no overwhelming responses by the parents with regard to the use of asking questions and “talk alouds”, and this may be a reflection of how learners work in class in comparison to working at home. More reports on the use of questions were noted by the class teacher, which could also indicate that the classroom context encourages the use of questions and interchange regarding learning, and that group contexts also provide more opportunities for use of questions and discussion. Moll (2001) indicates that the classroom context is a systematic context, where the learner engages with higher-order abstract thinking. Furthermore, Flavell (1987) stated that children in schools have repeated opportunities to monitor and regulate their cognition. “They have innumerable metacognitive experiences to acquire the knowledge of person, task and strategy variables” (p. 27). The context of the classroom is therefore an established environment for opportunity for learning, and is essential in generating and maintaining this metacognition, hence metastrategic knowledge. Greenberg (2000a) supports this view and indicates that “developing inquiring learning contexts, allow learners to engage in critical thinking, which gives the learner the opportunity to accomplish the
internal processing crucial to learning” (p. 29). Mediated learning in the classroom is thus more than good teaching, where the learner is empowered to contribute to discussions and through the process of sharing, knowledge is constructed and development occurs. As the classroom content, regarding the curriculum, is vast and the learner-to-teacher ratio is generally high in South African schools, it may not always be feasible for the teacher to engage frequently in open class discussion. This then has implications for future educational policies as “coverage” regarding curriculum, as described by Cottrell (2001), does not necessarily result in learning.

In addition to the classroom context and teacher-learner engagement, feedback as part of effective instruction was also indicated in the learners’ responses in the focus groups. The learners indicated that they need feedback from their teachers in order to improve their performance. The class teacher, however, indicated that revision after a test was carried out, as it was essential to show the class where they can improve (R. Soodyall, personal communication, 2008). Continho et al. (2005) and Cottrell (2001) suggest that feedback from teachers after a performance has shown benefits for improvements in learner performance. The different perceptions between the learners’ and the teacher’s view on feedback at the experimental school may indicate that the explanation on feedback and its importance to learning may not have been explicit enough for the learners to understand that it does happen in class. In contrast, feedback from this research was intentionally not part of the design, as it could have influenced the application and transfer of the metacognitive strategies in a repeated measures design. Therefore, not including feedback could be deemed as a limitation in the design of this study. Ongoing feedback on performance is thus an important part of the instruction, which influences the ethos of learning and achievement, and needs to be considered in future studies.

8.4 Achievement: Low versus High Performers

Since no statistically significant differences were found between the experimental and control groups on the CAS and the JET reading measures, the low and high achievers in these groups were examined, as low performers may have benefitted more from the metacognitive intervention. The intervention in the current study, as indicated earlier, was not based on the ATI framework, as the metacognitive strategies of the Cognitive Enrichment Advantage (CEA)
programme were not focused on deficits identified by the PASS constructs, and therefore this study differs in its methodology from the reported studies on ATI. A deficit model was not the intention, and the focus was instead on a developmental approach, where metacognitive strategies were introduced to encourage the potential of all learners in achieving successful outcomes in reading specifically and learning in general. Nevertheless, it is interesting to note that studies reported improvements when ATI was applied (Haddad et al., 2003; Naglieri & Gottling, 1997). These researchers argue that interventions based on an ATI framework achieve better results than general interventions. For example, Naglieri and Johnson (2000), in their study of 19 students from low to middle socio-economic levels, with learning difficulties and mild mental impairment, aged 12 to 14 years, with low scores on the planning subtest, benefitted more from the planning instruction (PI) intervention than students with weaknesses in attention, simultaneous and successive processing on the CAS. They applied a pre- and post-test design, and the intervention was conducted over three months. These researchers among others, discussed in chapter 5, indicated that the processing deficit identified in the CAS improved when the intervention met that need, confirming that the PASS theory was relevant in modifying instruction. These studies employed different methods, in terms of task and strategy variables, as well as length of time and use of the ATI methodology, and they can therefore not be compared to the present study. Nonetheless, certain trends or phenomena identified in these studies may have implications for understanding the outcomes of the current study.

The present study’s results also showed that the low performers made more gains than the high performers, but the results were not statistically significant (Table 7.15). This is expected as the high performers’ improvement at final testing may have been marginal in comparison to their performance at baseline. While the intervention was not directly targeting the specific cognitive processes tapped by the CAS, it may have influenced performance in this test. The CEA metacognitive strategies of exploration, planning, self-regulation, selective attention and thought integration selected for the intervention in this study are in alignment with the reading process, and these were discussed in detail in chapter 5. Reading and cognitive processing were inter-correlated and these results are discussed below. The trends identified in the quantitative results can be better understood in light of the qualitative measures employed in the experimental school.
The non-significant differences between the low and the high achievers in the experimental and control schools were similar to the outcomes in the Kroesbergen et al. (2003) study, which investigated the effects of a multiplication intervention in 167 students with lower planning scores. The intervention, unlike many other reported metacognitive studies, did not show a significant difference in performance across groups. Kroesbergen et al. (2003) explained this as being due to the type of intervention they employed. Unlike the study of Naglieri and Johnson, (2000), the intervention in Kroesbergen’s study did not focus on planning explicitly, but alluded to it in the maths intervention. This seems to confirm Naglieri and colleagues’ argument in support of ATI, where the intervention needs to be specific to the cognitive weakness indicated so that effective outcomes are achieved. As methodologies differ in these studies, it is difficult to draw comparisons. Nevertheless, the qualitative reports of learner experiences need to be considered in future intervention studies in conjunction with the quantitative data, so that the participants’ perceptions of the intervention can also be accessed (Miller & Crabtree, 1992). According to Green et al. (1989), this complimentarity of approaches results in an “enriched and elaborated understanding of the phenomena being studied” (p. 258).

8.5 Correlations between the CAS and the JET Reading Tests

The correlations between the CAS subtests and the JET reading measure were examined. There is no published record of these two tests being administered together in any South African or international literature. However, there are other South African reports of CAS being correlated with reading measures (Reid et al., 2002). Naglieri and Das (1997a) support the premise that reading performance is dependent on cognitive processing, and this was partially verified by the results in the present study. Statistically significant correlations were found between the CAS subtests (planning, simultaneous, attention and successive) and the JET reading totals (see Table 7.16). This was expected as reading tasks involve a range of cognitive processes (Flavell, 1987; Khami & Catts, 1991). However, the planning subtest, at baseline showed no significant correlation with reading at baseline, and the attention subtest at mid-year showed no significant correlation with reading at mid-year. Conversely, all of the CAS subtests correlated significantly
with reading at final testing. The difference over time might suggest that the intervention may have made the connections between the CAS subtests and the reading more explicit. The significant correlations between these measures confirm that the CAS and the JET reading tests shared similar processing skills at this point, supporting the claim that the PASS theory links to reading instruction. Naglieri and Das (1997a) argue that the PASS theory involves planning, attention, simultaneous and successive processing, which are fundamental to the processes in reading tasks.

Moreover, this study indicated that the majority of the subtests of the CAS indicated a weak to moderate correlation with the JET reading tests. As the associations were statistically significant for most subtests at most of the testing times, the CAS appears to be sensitive to the diverse population in this study, confirming its utility across cultures. This supports the findings of the Kroesbergen et al. (2003) study, which examined the relationship between maths and the PASS profile in 267 Dutch students with math learning difficulties (MLD), attending general or special education in the Netherlands. The results indicated that students with MLD performed significantly lower than their peers and obtained poorer scores for planning, confirmed the diagnostic value of the CAS. Furthermore, the Reid study (2001, cited by Reid et al., 2002) examined the use of the CAS within the South African context as well as investigated correlations between the CAS, the Woodcock Diagnostic Reading Battery and school results. Reid’s study revealed that significant associations were identified between these three measures, confirming the CAS’ validity for use within the South African context.

The relationship between the CAS subtests and the specific JET reading questions in the present study were also analysed to further understand the association between cognitive processing and reading (see Table 7.17). The results showed that statistically significant associations were indicated for the majority of the reading questions. This again was expected as the cognitive processes, as assessed by the CAS subtests, are integral to all reading tasks (Das, 2001). The questions in the JET reading measure evaluated the skills of inferencing, deductions, predictions, selecting information, logical reasoning, interpreting graphic text and figures, and analysis. These questions are indicative of abstract reasoning and problem-solving, and are considered as Level 3 questions in an assessment, consistent with the expectations of the South African school
curriculum (DoE, 2002). Furthermore, the design and purpose of the constructs determine the extent of the association, and this was evident when specific reading questions in the JET reading test and the subtests of the CAS were considered. Questions 1 and 4, which included general comprehension, selecting, interpreting and expressing information, were significantly correlated with all the CAS subtests. These reading questions therefore seem to encompass all PASS constructs, supporting Haddad’s findings that these constructs are required for reading comprehension (Haddad et al., 2003).

According to Naglieri and Das (1997), incoming information integrates with prior knowledge, which is processed in working memory (short term) and is then transferred to long-term memory in order to enhance the knowledge base, for later recall and retrieval. These correlations suggest that the learners in the experimental school were using the ability to attend to the information, plan or regulate the activity and decide what was relevant or irrelevant to the goal, while processing the information in their working memory before it was stored in their long-term memory. They had to use either simultaneous or successive processing, or alternatively both types of coding, to comprehend the information. The link between simultaneous and successive processing and reading is further indicated by Chow and Skuy (1999), who discuss coding in the two subtypes of learning disabilities, namely, that of nonverbal (NVLD) and verbal learning disabilities (LLD). They indicate that the NVLD group had difficulty considering the whole picture in a task, as well as having poor integration and simultaneous processing skills, which influenced their development of mental schema required for comprehension. This is supported by Das and colleagues’ extensive work in cognitive processing and reading, specifically phonological coding and successive processing (Das, 2001; Das, Mishra & Kirby, 1994; Das, Mishra & Pool, 1995).

The remaining reading questions indicated that the complexity of the task determined the cognitive processing involved. Consequently, planning was not significantly correlated with question 2, as skimming and scanning skills were predominantly required in this task. According to Das et al. (1994), the level of complexity of the task dictates the demand for planning. This question seemed to be low key, and skimming and scanning are quick overviews, which may not need in-depth analysis of planning. Moreover, when higher-order comprehension skills of inferencing and predicting were required, as on question 6, significant correlations with
simultaneous and successive processing were noted. Das (2001), and Chow and Skuy (1999) confirm that a fundamental association exists between these processes in relation to reading. It was also noted that learners needed to use syntactical knowledge for the comprehension of question 6, confirming that parsing (syntactical knowledge) was necessary for achieving meaning when reading (Das, 2001). Skills in deductive and logical reasoning, as in question 5, indicated significant associations with planning and attention constructs. This is supported by the findings of Naglieri and Gottling (1995) and Naglieri and Johnson (2000), where planning correlated highly with maths activities, which involved similar skills of deduction, logical reasoning and analytic thinking. The learner had to regulate cognitive control and monitor information, while simultaneously processing it into interrelated groups, confirming Naglieri and Johnson’s (2000) description of these constructs. Statistically significant associations found between the majority of the CAS subtests and the JET reading questions support the argument that the PASS constructs have relevance for reading instruction, and confirm the findings of Naglieri and colleagues, and Haddad et al. (2003).

The statistically significant correlations obtained in this study confirm that similar cognitive processes are evident in the CAS and the JET reading test, supporting the validity of the constructs measured by both tests. Naglieri and Rojahn (2004) found significant correlations between the CAS and the Woodcock-Johnson Revised Test of Achievement in 1 559 students aged 5-17. They found that the strength of the correlations between the cognitive processes and reading increased with age. They explained this as a result of increased academic levels, which make greater demands on abstract text, confirming that the PASS processes, as operationalised by the CAS, link with academic demands. These results also support the claim that reading and the PASS constructs share similar processing skills. The PASS constructs are not only implicated in reading tasks, but are implicated for all learning, and should therefore be considered when formulating activities at school, informing curriculum development. Several studies support the premise that the PASS constructs are relevant for instruction (for example, Haddad et al., 2003; Naglieri & Gottling, 1997). This understanding of the PASS model’s link to learning is essential for the South African education system, as the DoE is currently evaluating changes to the curriculum (Motshekga, 2010; M. Simelane, personal communication, 2010). The PASS model may be appropriate for South Africa, as the CAS was confirmed to be sensitive to diverse cultures and has links to instruction (Haddad et al, 2003; Kroesbergen et al., 2003; Reid et al.,
Furthermore, it indicated significant relationships with the JET reading test, a locally normed test, used by the DoE for assessment in education. This supports the findings of Naglieri and Rojahn (2004), discussed above, that the PASS constructs link with academic demands, making it relevant for consideration in reading instruction in South Africa.

The standardised measures used in this study examine a range of cognitive skills, but do not necessarily indicate explicit reflection of the learners’ metacognitive capabilities. The planning subtest of the CAS is the only one that allows for a description of the individual’s thought processes while being assessed on the matching numbers, planned codes and planned connections tasks, as the test administrator is required to indicate the strategies observed, as well as the learner responses, from the list of possible strategies provided. Additional strategies are also recorded. This is insufficient in terms of understanding metacognitive processes and needs to be recorded in conjunction with a narrative, as the affect and motivation of the learner should be included in the cognitive applications. Feuerstein et al. (1980) and Greenberg (2005) emphasise the importance of the combined effect of affect, motivation and cognition, which should present a richer data source about metacognition. Measurement of metacognition therefore continues to be a debatable issue, even though Jacobs and Paris (1987) maintain that a precise definition and measures of metacognition may reduce some of the concerns encountered in assessment. On the basis of the results from the present study, it is argued that the use of only standardised quantitative measures without any qualitative measures would have limited the understanding of the learners’ ability to think when reading or learning, and would have also limited the benefits that could be gained from a metacognitive intervention, which develops these skills. Thus, this study supports the use of a mixed methods approach, as a combination of quantitative and qualitative data provides insight into the learners’ thinking experience and also informs measures for best practice.

8.6 Summary of Discussion

The mixed methods approach used in this research examined both quantitative and qualitative outcomes. Although the qualitative data was embedded in a mainly quantitative paradigm, consideration to both outcomes was given as each approach has its own clinical and theoretical
implications. The value of one approach enhances the other, and highlights the researcher’s understanding of the phenomena more than was initially anticipated (Bryman, 2006). When examining the quantitative and qualitative data, and attempting to understand the conclusions drawn, a number of arguments were made including types of measures used for assessment of thinking, transfer, duration and length of exposure to the intervention, collaborative group work, contextual demands and family-school partnerships, in addition to sample size and learner differences.

The learners’ performance regarding their reading and cognitive processes in the standardised quantitative data (JET reading and CAS, respectively), quantifiable qualitative data (sentence completion, baseline questionnaire, teacher and parent scales) and the qualitative measures (focus groups and open comments from the interview questionnaires) indicated varied results. No statistically significant interactions were noted on the JET and the CAS tests between the experimental and the control schools, or within the experimental groups. The lack of statistically significant differences was argued as being related to the sample size and individual differences in the learners. Furthermore, the use of standardised assessments, delayed post-intervention testing and length of engagement with the metacognitive strategies were alluded to as influencing outcomes. When the qualitative data were examined, changes and trends noted in the experimental school learners could be understood. Learners in the experimental groups were initially aware of content-based strategies that assisted them in their reading, but incorporated metacognitive strategies once the instruction was more explicit. Their knowledge of strategies was evident in the word definition tasks and in their application to varied contexts. This was supported by the teacher and their parent feedback. The learners’ perspectives in the third theme “evaluation and opinions” on the metacognitive intervention, raised several issues including duration and exposure to the intervention, and their implications for the consolidation of learning. Implications for the type of instruction also emerged as the learners felt that the metacognitive instruction provided an avenue for active participation, verbal discussions, group interactions and learner recognition.

Notwithstanding the limitations and the non-significant quantitative results, explicit metacognitive instruction has a role to play in education, especially in South Africa. Regardless of which programme is selected, the philosophy of mediation and active engagement of learners
is key, and was positively referred to in the responses from focus groups. The metacognitive strategies require inclusion into the curriculum, encouraging the use and the development of metastrategic knowledge. Moreover, it appears that learners need to engage verbally so that thinking is promoted prior to involvement in written activities. Explicit instruction of the metacognitive strategies is likely to promote transfer to other activities. The learners wanted to be involved in designing visual and auditory aids so that they can assume ownership of these metacognitive strategies, developing independent skills and accountability with regard to their learning. Furthermore, learner-school- parent partnerships appear to be essential for effective use and development of lifelong learners. The programme needs to include both content and metacognitive strategies, and it must ensure that the metacognitive strategies can be generalised across subjects and content. It is also important to take into account the worldviews and knowledge base of the learners, as this influences thinking and learning. The length and exposure to the intervention and its immersion into the curriculum are fundamental for effective consolidation and impact on learning outcomes.

In summary, the responses that relate to the three themes, “knowledge of strategies”, “understanding of strategies”, and “evaluation and opinions” indicate that the awareness and perceptions of the participants in this study were positive. Furthermore, the participants expressed benefits from this intervention that have implications for a change in the type of classroom instruction presented in schools. Implications from the learners’ interviews corroborate suggestions made in previous studies such as those of Berger et al. (2008) and Hay (2000), which can inform education policy on classroom instruction. The measures used in the current study have a wealth of information, contributing to the outcomes and implications, but may also have some limitations, which could restrict and confine the interpretation of the findings. These limitations and the implications derived from the findings, however, add new knowledge to understanding metacognitive instruction and its application in the South African education system.
8.7 Conclusion

This study’s contributions to theoretical and clinical practice are elaborated in the final chapter, but a few points are highlighted here.

A mixed methods approach utilised in this study provided a detailed and rich data source, as well as a deeper understanding of the learners’ experience with metacognition, and should be included in future intervention studies. The cross-over design in the intervention allowed the second experimental group to act as a control for the first experimental group, and provide immediate versus delayed post-test comparisons. The CAS, which is a sensitive measure across cultures, shares similar processes with the JET reading test, which links the PASS constructs to instruction and to academic demands. This study also adds to the body of knowledge on EBP within a South African context, promoting best practice models.

The clinical implications of this study include transfer and how sustained effects of metacognition are influenced by the learners’ length of exposure to and the time immersed in the metacognitive intervention. This links to understanding of how the novice differs from the expert thinkers. Explicit instruction is a requisite for metacognition to be realised, and needs to be part of the curriculum. Awareness, reflection, monitoring and evaluating must be explicitly taught and be an element in the process of thinking in classrooms. The issue of domain specificity, however, needs to be considered, as ATI studies reported success in their design. The learners also benefitted from group discussions through verbalisation and “talk-aloud” strategies, making their implicit reflections explicit. A partnership among learners, teachers, peers and parents is of critical importance for transfer of learning to take place; and a culture of thinking as the premise for motivated independent learners must be stressed so that an attitude of lifelong learning is developed.
9.1 Introduction

Reflection on thinking is emphasised as important by Maxwell (2008), as it impacts particularly school-aged learners on their present learning outcomes and future aspirations. Teachers and therapists have a responsibility “to create a thinking environment for our learners, where they are given space and time to think” (Kline, 2009, p. 14). Therefore explicit instruction on thinking is believed to be necessary for successful scholastic performance, reinforcing teaching as a dynamic system, where teacher and learner form partnerships that significantly influence scholastic performance (Hay, 2000; Hurte, 2004). This study examined the effectiveness of metacognitive instruction on reading comprehension among Grade six learners in a Gauteng school.

Metacognition continues to be a complex construct to define and measure. The nature of thinking is fluid and dynamic, and tends to lose its essence if the definition, measurement and instruction outcomes are static. Measurement and reporting of cognition and metacognition will therefore continue to be debated in education. Research nevertheless needs to be published so that insights obtained can be shared, as each experience has unique qualities, informing practice. When selecting programmes for intervention, it is important to bear in mind that no one cognitive programme is to be seen as the ultimate product for metacognitive instruction. Assessment and instruction in this area will continually change although the principles of mediation (process) should remain foundational. According to Haywood (2008), irrespective of the programme selected, the principles of mediation need to be respected at all times for success. This is also important as there is an interest in EBP research which requires theoretically grounded interventions and rigorous research practice. Several debates exist in cognitive education, and these are discussed and linked to theory and practice. The implications, limitations and suggestions for future research derived from this study are discussed next. An attempt to understand the findings in this study is made by using the terms proposed by Patton (2001), for example “obvious-obvious” which refers to findings that are
already evident in the literature and may be confirmed by the present study. “Obvious-dubious” findings refer to those that create ambiguity, where for example, statistically significant results were expected in a research question but were not evident in the final outcomes; and “dubious-obvious”, refers to the ambiguous findings which may contribute to knowledge, leading to theoretical and clinical implications.

### 9.2 Summary of Discussion

From the ensuing discussion of the research study, it was concluded that the learners in the experimental school did not show any statistically significant differences in their reading or cognition on the standardised tests, following the intervention, when compared to the control school. However, the qualitative data revealed increased awareness of the effects of metacognitive instruction on their reading in particular and on their learning in general. The use of a mixed methods approach was thus valuable in this study, as an understanding of the learners’ experience in this metacognitive intervention would have been lost, had the focus only been on the quantitative outcomes.

The absence of statistically significant results in the quantitative data could be related to the sample size, learner variability, and duration and length of exposure to the intervention, as well as transfer of strategies. From the qualitative results, it appeared that the learners in the experimental school were able to retrieve knowledge of the metacognitive strategies and define the concepts introduced in the intervention. They also indicated that the metacognitive intervention presented an avenue that encouraged social learning where group discussions allowed for verbalisation, which improved their understanding of metacognitive strategies and encouraged them to think about their thinking. The learners were also able to select relevant contexts for application, indicating their understanding of the concepts introduced. Transfer of the metacognitive skills cannot be confirmed because immediate post-test performance may reflect application but not precise transfer. Therefore, any improvement at this point cannot conclusively be attributed to the intervention itself. Nevertheless, increased learner, parent and teacher awareness were expressed, and provides a window into possible changes in viewing educational pedagogy. The metacognitive intervention also appeared to promote confidence in the learners who could present their opinions and evaluations of their experience, reiterating that active discussion in the learning process was valued, which adds
to making the “obvious obvious” or the “obvious dubious” and the “dubious obvious” findings understandable (Patton, 2001). These are discussed next in this chapter.

9.3 Clinical and Theoretical Implications

From this study, several issues are apparent, which have methodological, theoretical and clinical implications for the fields of psychology and education. This includes the research design, explicit metacognitive instruction, and the duration of the intervention, a balance between product and process, cognitive and assessment measures. It is essential to consider these implications when aiming for effective transfer of metacognition across all subject areas, resulting in developing independent and interdependent life-long learners.

Firstly, the mixed methods design was valuable for investigating this study’s research questions, as focus only on any one approach would have presented a singular view of the outcomes and would not have provided such a rich understanding of the learners’ metacognitive experience in the intervention. It is recommended that such a methodology be considered in future intervention studies, as the outcomes are more than the sum of their individual quantitative and qualitative parts, supporting Bryman’s (2007) view on the mixed methods approach. Secondly, a cross-lagged design was used in the intervention phase, which allowed one group to act as the control within the experimental school, permitting observation of performance, at immediate- and delay post-testing times.

Thirdly, duration and the length of exposure to the intervention warrant discussion. This has several implications for learning, consolidation, practice of the metacognitive strategies, spontaneous application and transfer. The metacognitive strategies have to be presented in a mediated framework, as recommended by Feuerstein et al. (1980) and Haywood (2008), so that meaning is constructed and transfer is effected. The mediated process should allow learners to engage by sharing, clarifying and verbalising their points of view, making their thinking explicit. This is also supported by Vygotsky’s (1934/1987) premise of knowledge construction, firstly interpersonally, in interaction with others and then internalising the learning intrapersonally for development.

Fourthly, the type of cognitive assessment measures used to access performance has implications for learner outcomes. The standardised tests, namely the CAS and the JET reading provided data on the cognitive and reading processes respectively. In addition,
significant intercorrelations were indicated for the majority of the subtests, confirming that similar processes are involved in performances on these measures. However, these tests did not explicitly indicate reflections of thoughts, affect and perceptions of the learners’ application of the metacognitive strategies. The qualitative measures, on the other hand, provided information relating to the perceptions of the participants on the metacognitive intervention. According to Burden (2011), attitudes and dispositions add further understanding to the assessment of knowledge and skill of the learner; hence triangulation of data sources is essential in order to gain a holistic view of the learners’ performance in the metacognitive intervention. Both quantitative and qualitative assessment approaches have strengths and limitations, and therefore rigorous practice should incorporate both to increase reliability and legitimation. Assessment therefore, in addition to providing valid evidence, informs intervention practices. Standardised assessment measures will nevertheless continue to be a contested issue, but new knowledge that emerges whenever a study is conducted and reported will contribute to a better understanding of these issues. Using the assessment measures (CAS and JET reading) in this study was also beneficial as they provided objective data regarding cognitive and reading performances at pre- mid-year and post-test.

Fifthly, the concept of novice and expert thinker status is where learners, when introduced to new learning, are considered to be novices and not until they become more experienced, can sufficient evidence of their generalisation of metacognitive strategy use be observed (Halpern, 1987; Wittwer & Renkl, 2008). The learners require rehearsal and practice in order to make the new learning accessible for transfer. This is important as it has implications for classroom instruction in that opportunities for reflective practice must be created. Novice or expert metacognitive ability relates to research which refers to less mature versus more mature thinkers. This, however, does not imply that only when learners are much older chronologically can metacognition be effective. It means that “awareness of the thinking processes”, irrespective of the age of introduction, should allow learners to engage with their thinking and transfer their learning, provided the intervention is sustained and integrated in all aspects of the curriculum. This was alluded to by Whitebread, Binham, Grau, Pasternak and Sangster (2007), who observed metacognitive behaviours in British children aged 3-7 years, for two years. The children were working in groups without the supervision of adults. The length of time is therefore important for mastery of the metacognitive strategies so that effective transfer can be observed. Metacognition develops with age and needs sufficient rehearsal and practice, and instruction (Flavell et al., 1993; Wittwer & Renkl, 2008). Explicit
instruction is thus vital as it is not a spontaneous process or automatic development (Hay, 2000). Finally, the concept of whole school-family partnerships, proposed by Greenberg (2000a, 2005a), is fundamental and relates to transfer of learning. A common language for learning metacognitive strategies among significant people associated with the learner will assist in consolidating their learning.

This study appears to support research that awareness of thinking and its effects on learning can improve with explicit instruction (Hay, 2000). Flavell (1987) concurs that metacognitive skills allow students to benefit from instruction, influencing the use and maintenance of cognitive strategies. Metacognitive instruction thus provides an alternative focus to content only, by emphasising process, which is generalisable to other learning contexts. Explicit instruction and mediation are essential, irrespective of the background of the individual, especially in a country as diverse as South Africa, and schools need to work towards a paradigm shift from only content to content and process. Additionally, Burden (2011) reiterates that schools need to display this mind-set change if they want to be considered “thinking schools”. Moreover, school systems need to consider their epistemology and theories of learning, in addition to their ecological and historical context, as reflection on the thinking and learning processes do not occur in isolation, but are influenced by their frame of reference or knowledge base (Hyerle, 2011).

The educational policy needs to assist teachers in promoting meditational skills, as metacognitive and cognitive intervention strategies are relevant to all learners (Gajria et al., 2007). Teaching and learning in the classroom needs to be considered, as evoking an awareness of metacognition among learners creates an arena for the development of reflection, monitoring and evaluation. Instruction should also be linked to all contexts, and be part of the curriculum so that it is not compartmentalised or related to one domain or genre, but rather be seen as fundamental to all content taught. This type of instruction and exposure over time has implications for learning and transfer of skills across content. It would provide learners with the opportunity to make comparisons, identify their individual learning styles, so that application is relevant. A balance in instruction between content and process is important as it adds value to effective learning (Haywood, 1977). From the results of this study, the strengths and limitations, in terms of research design and process of the metacognitive intervention, were identified and are discussed next.
9.4 Strengths and Limitations of this Study

This study’s strengths included the use of a South African standardised reading measure that is currently applied by the DoE in reading assessment, indicating relevance to the context. In addition, the attempt to address the low levels of literacy currently reported was the subject context for exploring the transfer of metacognitive strategies. Positive, weak to moderate correlation between all the CAS subtests and reading at final testing were found, implying that the tests share similar cognitive processes. This suggests that the CAS test is sensitive to the diverse populations and has been applied in different studies in South Africa (Moonsamy, 2004; Reid (2001 cited in Reid et al., 2002). The associations between the CAS subtests and the JET reading test indicate that both appear to tap into relevant skills underlying academic content, which is important as the JET reading test is used in national assessments. In addition, the design utilised triangulation of data sources, providing verification of information and supporting the benefits of a mixed methods approach in intervention research. The metacognitive intervention was provided by a qualified speech-language therapist who has a robust theoretical and clinical background in mediational principles. Furthermore, learner performance from both quantitative and qualitative measures was available for analysis and interpretation. In addition to the strengths identified, this study represents a field study, conducted in a natural context, hence certain limitations were noted and these are presented below.

Measures for assessment.

The limitations of this study included the use of the CAS, which is not normed on South African children, and the use of a South African reading test, normed on its population but still in its infancy of use. Despite this, these tests indicated moderate to good internal consistency for the JET reading and CAS respectively, confirming good reliability of measures. These quantitative measures assessed the levels of ability in skills that were assumed to show improvement following the metacognitive intervention in the learners. The qualitative measures provided input about the participants’ perceptions regarding the metacognitive strategies and the intervention process. Although self-reporting techniques are seen as a limitation in studies, they were used in this study in order to provide triangulation of several data sources. Furthermore, rigorous practice was attempted to ensure reliability and legitimation. Not including the qualitative measures (interviews and focus groups) in the control school was also seen as a limitation, which could have provided valuable information.
to be contrasted with that of the experimental groups. Furthermore, delayed post-testing would have been useful in evaluating the effects of the metacognitive experiences for the second experimental group but due to time constraints, within the school context, it could not be included in this study.

*Feedback to learners.*

Presenting feedback to the learners after each assessment measure was not part of the design and may be considered a methodological limitation. This was not done as repeated measures were conducted and feedback may have influenced performance. Feedback to learners is important for learning to be consolidated (Hattie, 1992), and this issue would need to be taken into consideration in future studies.

*Length of exposure and sufficient practice.*

The duration and length of exposure to the intervention may have contributed to the study’s outcomes. Different ways of introducing longer intervention measures thus need to be considered. This may also have influenced the immediate post-test performance, as the learners may not have had sufficient practice with the instruction to apply and transfer skills effectively and spontaneously. The literature mentions that experience will move learners from novice to expert status in thinking, hence the need for longer periods of teaching and practising the metacognitive strategies (Wittwer & Renkl, 2008).

*Sample size and geographical location.*

The sample size was deemed small but sufficient for the context, the class composition and statistical analysis. Ideally, a larger sample sizes across schools in a region would be recommended. The study was concentrated within a particular geographical location due to convenient sampling procedures, and similar studies may need to cover more regions for future use, and also include less affluent regions. These factors are likely to impact on transferability of results and statistical significance of results.
9.5 Suggestions for Future Research

From the implications and the limitations presented, future studies may be guided. A similar study in less affluent areas may provide more evident gains and would be useful in less advantaged geographical areas in South Africa, where the disparity in achievement is hugely evident (Fleisch, 2008). Furthermore, larger samples of learners may indicate larger effect sizes. Delayed post-intervention testing of the participants can be included in a pre- and post-test design to determine the effects of transfer and maintenance of the learning.

Further research can assess the effects of the metacognitive intervention on specific subject areas, such as maths and language, following the provision of teacher training, using an experimental and control school context. The metacognitive intervention could be included in lower grades, especially in the first year of school so that the effects of the metacognitive instruction can be monitored, especially at the end of Grade three, providing evidence at an exit level from the foundational phase. This would inform evaluation and intervention processes of scholastic performance, avoiding the frequently reported “Grade 4 slump” described by Brozo (2005).

9.6 Concluding Remarks

The bimodal distribution of achievement (this refers to the vastly different levels of achievement between urban and rural schools, and is described by Fleisch, 2008) is a reality in South Africa, and needs to be addressed. To redress this disparity, education needs to be promoted as the forerunner of economical development, which will impact in different ways on how funding can be approached, in addition to informing budgeting within the country and promoting business contributions. The government needs to provide resources in rural and peri-urban areas, but these cannot be sustained if the economy does not promote job opportunities for the families in these regions. Additionally, a reading policy should be formulated based on sound measures for introducing skills, assessment, monitoring and evaluating progress. Such a policy can only be implemented if sufficient teacher training and continuing education policies are instituted. Given this context, teacher training with a focus on explicit metacognitive instruction may be the answer to changing the culture of thinking in learners. Thus, according to Mooney (2009), referring to university students, even the “students who are considered high achievers at school are not adept in the culture of critical
thinking” (p. 280). Therefore, changing the mind-set of teachers and learners on metacognitive instruction may be a way of developing independent thinkers and helping them to reach their cognitive potential and to be effective problem-solvers who are able to meet the challenges of the information age (Martin, 2000).

Although metacognitive and cognitive programmes and related materials may have solid foundations in theory and practice, they would have to be adapted in order to be relevant for particular contexts. Implementation can only be effective if adequate training and understanding of the underlying philosophy and concepts of mediation are provided. This can be seen in the adoption and implementation of the OBE framework in South African education where, according to Cross et al. (2002), both macro- and micro-indicators need to be considered in the adoption of grand philosophies and ideals in order to be effective. He also stated that realism and pragmatism in education are essential so that “attention is not only on what schools in society stand for but also on what they can realistically do and achieve, given their legacies and the particular circumstances in which they operate” (p. 172). Metacognitive instruction can thus be part of the basic training for teachers provided its implementation is considered carefully and is in line with the curriculum selected.

Instruction in metacognitive strategies could be beneficial at teacher training institutions as well as at in-service training courses for teachers who are in practice. Parents could also be part of the in-service training as partnerships between parents and schools are essential for effective transfer of learning, linking school learning to lifelong learning (Greenberg, 2005a). Furthermore, industry needs to be aware of the importance of thinking skills so that transfer into the workplace is achieved, promoting thinking individuals and thinking nations, thereby building successful economies. It cannot be assumed that a paradigm shift will have an immediate effect, as this journey is expected to be a gradual process, and thorough planning for content link and implementation is fundamental for success. The benefits of metacognitive instruction are that it can be applied to other intervention contexts, including speech-language and hearing therapies, medicine, psychotherapy and allied medical professions, as discussed by Haywood (2001).
The learners in this study indicated that awareness of the metacognitive strategies in reading and learning that they learnt in the intervention, encouraged reflection on and their use of these instructional practices which included group interactions, verbalisation, questioning and "self-talk". This supports Haywood's (2003) comment that awareness of the need to know and reflect on thinking, is the cognitive conflict, which drives cognitive development. Hence explicit instruction and demonstration of reflective practice by educators could promote cognitive education in South Africa.


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Education, Inc.


http://archive.unu.edu/Africa/files/UNU_RevalitizingHigherEducation.pdf


A: Ethics
UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (NON-MEDICAL)
R14/49/1  Moonsamy

CLEARANCE CERTIFICATE

PROTOCOL NUMBER H071003

PROJECT

Effectiveness of Metacognitive instruction on reading comprehension among Intermediate learners: Its link to the PASS theory

INVESTIGATORS

Mrs S Moonsamy

DEPARTMENT

Speech pathology and audiology/Speech pathology

DATE CONSIDERED

2007.10.12

DECISION OF THE COMMITTEE*

Approved Unconditionally

NOTE:

This ethical clearance is valid for 2 years and may be renewed upon application

DATE

2007.10.17

CHAIRPERSON

(Professor M Vorster)

cc: Supervisor :  Dr K Cockcroft
     School of Human and Community D

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and ONE COPY returned to the Secretary at Room 10004, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. I agree to a completion of a yearly progress report.

Signature

This ethical clearance is valid for two years from date of approval.

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES
B: Reading Comprehension Protocol
Appendix B

Pilot study: Curriculum-based comprehension

Dear Educator

Please fill in the following using the scale 1-5, where

1 = poor, 2 = satisfactory, 3 = average, 4 = good, 5 = very good

Passage Number: 

Title: 

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<td>Other</td>
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</table>
Fax

To: Faaizah Parissie
From: Sharon Munosamy

Fax: (011) 355 0512
Pages: 3

Phone: Date:

Re: CC:

☐ X Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

Comments:
Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

Permission has been granted to proceed with the above study subject to the conditions listed below being met, and may be withdrawn should any of these conditions be flouted:

1. The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.
2. The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.
3. A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.
4. A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.

5. The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, and chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.

6. Research may only be conducted after school hours so that the normal school programmes is not interrupted. The Principal (if at a school) and/or Director (if at a district/head office) must be consulted about an appropriate time when the researchers may carry out their research at the sites that they manage.

7. Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year.

8. Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.

9. It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.

10. The researcher is responsible for supplying and utilising his/her own research resources, such as stationary, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.

11. The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of these individuals and/or organisations.

12. On completion of the study the researcher must supply the Director: Knowledge Management & Research with one Hard Cover bound and one Ring bound copy of the final, approved research report. The researcher would also provide the said manager with an electronic copy of the research abstract/summary and/or annotation.

13. The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.

14. Should the researcher have been involved with research at a school and/or a district/head office level, the Director concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

Kind regards

[Signature]

Tom Wasse
CHIEF INFORMATION OFFICER

The contents of this letter has been read and understood by the researcher.

Signature of Researcher:

Date:
RESEARCH REQUEST FORM

REQUEST TO CONDUCT RESEARCH IN INSTITUTIONS AND/OR OFFICES OF THE GAUTENG DEPARTMENT OF EDUCATION

1. PARTICULARS OF THE RESEARCHER

<table>
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<tr>
<th>1.1</th>
<th>Details of the Researcher</th>
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<tbody>
<tr>
<td>Surname and Initials:</td>
<td>Moonsamy S.</td>
</tr>
<tr>
<td>First Name/s:</td>
<td>Sharon</td>
</tr>
<tr>
<td>Title (Prof / Dr / Mr / Mrs / Ms):</td>
<td>Mrs.</td>
</tr>
<tr>
<td>Student Number (if relevant):</td>
<td>783413/8</td>
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<th>1.2</th>
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<tr>
<td>Home Address</td>
<td>Postal Address (if different)</td>
</tr>
<tr>
<td>16 Hartjes Road</td>
<td>P.O. Box 314</td>
</tr>
<tr>
<td>Oakdene</td>
<td>Linmeyer</td>
</tr>
<tr>
<td>Johannesburg</td>
<td>Johannesburg</td>
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<tr>
<td>Postal Code: 2190</td>
<td>Postal Code: 2105</td>
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<tr>
<td>Tel: (011) 435 2993</td>
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<tr>
<td>Cell: 083 284 8215</td>
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<tr>
<td>Fax: (011) 435 2993 (h)</td>
<td>(011)717 8324</td>
</tr>
<tr>
<td>E-mail: <a href="mailto:Sharon.moonsamy@wits.ac.za">Sharon.moonsamy@wits.ac.za</a></td>
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2. PURPOSE & DETAILS OF THE PROPOSED RESEARCH

2.1 Purpose of the Research (Place cross where appropriate)

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2.2 If Post-Graduate Study – Please indicate by placing a “X” in the appropriate column

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2.3 Full title of Thesis / Dissertation / Research Project

Effectiveness of Metacognitive Instruction in Reading Comprehension among Intermediate Phase Learners: Its Link to the PASS Theory

2.4 Value of the Research to Education (Attach Research Proposal)

Research has shown that metacognitive instruction in the classroom has definite benefits for the learner, where improved maths or reading comprehension has been evident. In addition, cognitive processes of Planning, Attention, Simultaneous and Successive processing (PASS) are influenced positively. It has implications for continued educator development, classroom instruction and benefits for enhancing reading comprehension, as well as overall literacy levels of learners. (see proposal attached)
### 2.5 Student and Postgraduate Enrolment Particulars (if applicable)

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<td>Name of Supervisor / Promoter:</td>
<td>Dr. Kate Cockcroft</td>
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### 2.6 Employer (where applicable)

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<tr>
<td>Position in Organisation:</td>
<td>Senior Clinical Supervisor/ Lecturer</td>
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<td>Head of Organisation:</td>
<td>Head of School: Prof Duncan / Prof.</td>
</tr>
<tr>
<td></td>
<td>Head of Dept: Prof Claire Penn</td>
</tr>
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<td>Postal Code:</td>
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<tr>
<td>Telephone Number (Code + Ext):</td>
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<td>Fax Number:</td>
<td>(011) 717 8324</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:Norman.duncan@wits.ac.za">Norman.duncan@wits.ac.za</a> / <a href="mailto:Claire.penn@wits.ac.za">Claire.penn@wits.ac.za</a></td>
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### 2.7 PERSAL Number (where applicable)

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### 3. PROPOSED RESEARCH METHOD/S

(Please indicate by placing a cross in the appropriate block whether the following modes would be adopted)

3.1 **Questionnaire/s (If Yes, supply copies of each to be used)**

<table>
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3.2 **Interview/s (If Yes, provide copies of each schedule)**

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3.3 **Use of official documents**

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*If Yes, please specify the document/s:*

3.4 **Workshop/s / Group Discussions. (If Yes, Supply details)**

<table>
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<th>NO</th>
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- Group Intervention – learners
- Parent Group – Introduction of Research / feedback
- Educator workshops – on completion of study

3.5 **Standardised Tests (e.g. Psychometric Tests)**

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<th>YES</th>
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*If Yes, please specify the test/s to be used and provide a copy/ies*

- Cognitive Assessment System (CAS) Das & Naglieri
- Reading Test: JET Educational services
- Clinical Evaluation of Language Fundamentals

For copyright reasons, these cannot be attached, however the originals can be shown to the relevant authority.
4. RESEARCH PROCESSES

4.1 *Types of Institutions.* (Please indicate by placing a cross alongside all types of institutions to be researched).

<table>
<thead>
<tr>
<th>INSTITUTIONS</th>
<th>Mark with &quot;X&quot; here</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Schools</td>
<td>x</td>
</tr>
<tr>
<td>Secondary Schools</td>
<td></td>
</tr>
<tr>
<td>Technical Schools</td>
<td></td>
</tr>
<tr>
<td>ABET Centres</td>
<td></td>
</tr>
<tr>
<td>ECD Sites</td>
<td></td>
</tr>
<tr>
<td>LSEN Schools</td>
<td></td>
</tr>
<tr>
<td>Further Education &amp; Training Institutions</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

4.2 *Number of institution/s involved in the study.* (Kindly place a sum and the total in the spaces provided).

<table>
<thead>
<tr>
<th>Type of Institution</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Schools</td>
<td>2</td>
</tr>
<tr>
<td>Secondary Schools</td>
<td></td>
</tr>
<tr>
<td>Technical Schools</td>
<td></td>
</tr>
<tr>
<td>ABET Centres</td>
<td></td>
</tr>
<tr>
<td>ECD Sites</td>
<td></td>
</tr>
<tr>
<td>LSEN Schools</td>
<td></td>
</tr>
<tr>
<td>Further Education &amp; Training Institutions</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>
4.3 *Name/s of institutions to be researched.* (Please complete on a separate sheet and append if space is deemed insufficient).

<table>
<thead>
<tr>
<th>Name/s of Institution/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parkview Senior</td>
</tr>
<tr>
<td>Emmarentia Primary</td>
</tr>
</tbody>
</table>

4.4 *District/s where the study is to be conducted.* (Please mark with an “X”).

<table>
<thead>
<tr>
<th>District</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johannesburg East</td>
</tr>
<tr>
<td>Johannesburg South</td>
</tr>
<tr>
<td>Johannesburg West</td>
</tr>
<tr>
<td>Johannesburg North</td>
</tr>
<tr>
<td>Gauteng North</td>
</tr>
<tr>
<td>Gauteng West</td>
</tr>
<tr>
<td>Tshwane North</td>
</tr>
<tr>
<td>Tshwane South</td>
</tr>
<tr>
<td>Ekhuruleni East</td>
</tr>
<tr>
<td>District</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>Ekhuruleni West</td>
</tr>
<tr>
<td>Sedibeng East</td>
</tr>
<tr>
<td>Sedibeng West</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>If Head Office/s (Please indicate Directorate/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**

If you have not as yet identified your sample/s, a list of the names and addresses of all the institutions and districts under the jurisdiction of the GDE is available from the department at a small fee.

4.5  *Number of learners to be involved per school.* (Please indicate the number by gender).

<table>
<thead>
<tr>
<th>Grade</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>B</td>
<td>G</td>
<td>B</td>
<td>G</td>
<td>B</td>
<td>G</td>
</tr>
<tr>
<td>Number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+/- 45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>B</td>
<td>G</td>
<td>B</td>
<td>G</td>
<td>B</td>
<td>G</td>
</tr>
<tr>
<td>Number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.6 **Number of educators/officials involved in the study.** (Please indicate the number in the relevant column).

<table>
<thead>
<tr>
<th>Type of staff</th>
<th>Educators</th>
<th>HODs</th>
<th>Deputy Principals</th>
<th>Principal</th>
<th>Lecturers</th>
<th>Office Based Officials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.7 **Are the participants to be involved in groups or individually?** Please mark with an “X”.

<table>
<thead>
<tr>
<th>Participation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>⃝</td>
</tr>
<tr>
<td>Individually</td>
<td>⃝</td>
</tr>
</tbody>
</table>

4.8 **Average period of time each participant will be involved in the test or any other research activity** (Please indicate time in minutes)

<table>
<thead>
<tr>
<th>Participant/s</th>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individually</td>
<td>Baseline Measures</td>
<td>3 hours x 3 times per year</td>
</tr>
<tr>
<td>Group</td>
<td>Intervention</td>
<td>4x 30 min for each group</td>
</tr>
</tbody>
</table>

4.9 **Time of day that you propose to conduct your research.** Please mark with an “X”.

<table>
<thead>
<tr>
<th>School Hours</th>
<th>During Break</th>
<th>After School Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>⃝</td>
<td>⃝</td>
<td></td>
</tr>
</tbody>
</table>

4.10 **School term/s during which the research would be undertaken.** Please mark with an “X”.

<table>
<thead>
<tr>
<th>First Term</th>
<th>Second Term</th>
<th>Third Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>⃝</td>
<td>⃝</td>
<td>⃝</td>
</tr>
</tbody>
</table>
DECLARATION BY THE RESEARCHER

1. I declare that all statements made by myself in this application are true and accurate.

2. I have read and fully understand all the conditions associated with the granting of approval to conduct research within the GDE, as outlined in the GDE Research Briefing Document, and undertake to abide by them.

3. Should I fail to adhere to any of the approval conditions set out by the GDE, I would be in breach of the agreement reached with the organisation, and all privileges associated with the granting of approval to conduct research, would fall away.

Signature: 

Date: September 2007
**DECLARATION BY SUPERVISOR / PROMOTER / LECTURER**

*I declare that: -*

1. The applicant is enrolled at the institution / employed by the organisation to which the undersigned is attached.
2. The overall research processes meet the criteria of:
   - Educational Accountability
   - Proper Research Design
   - Sensitivity towards Participants
   - Correct Content and Terminology
   - Acceptable Grammar
   - Absence of Non-essential / Superfluous items

<table>
<thead>
<tr>
<th>Surname:</th>
<th>Cockcroft</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Name/s:</td>
<td>Kate</td>
</tr>
<tr>
<td>Institution / Organisation:</td>
<td>University of the Witwatersrand</td>
</tr>
<tr>
<td>Faculty:</td>
<td>Humanitites</td>
</tr>
<tr>
<td>Department:</td>
<td>School of Human &amp; Community Development: Department of Psychology</td>
</tr>
<tr>
<td>Telephone:</td>
<td>(011) 717 4511</td>
</tr>
<tr>
<td>Fax:</td>
<td>(011) 717 4559</td>
</tr>
<tr>
<td>Cell:</td>
<td>082 865 3128</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:Kate.cockcroft@wits.ac.za">Kate.cockcroft@wits.ac.za</a></td>
</tr>
<tr>
<td>Signature:</td>
<td>[Signature]</td>
</tr>
<tr>
<td>Date:</td>
<td>September 2007</td>
</tr>
</tbody>
</table>

N.B. This form (and all other relevant documentation where available) may be completed and forwarded electronically to Ebrahim Farista (ebrahimf@cpq.gov.za) or Nomvula Ubisi (nomvulau@cpq.gov.za). The last 2 pages of this document must however contain the original signatures of both the researcher and his/her supervisor or promoter. These pages may therefore be faxed or hand delivered. Please mark fax - For Attention: Ebrahim Farista at 011 355 0512 (fax) or hand deliver (in closed envelope) to Ebrahim Farista (Room 911) or Nomvula Ubisi (Room 910), 111 Commissioner Street, Johannesburg.
D: Consent Letters- Principals
APPENDIX: D

Principal Information and Permission Form: Experimental School

Dear Principal:

My name is Sharon Moonsamy and I'm a PhD student in Speech Pathology at the University of the Witwatersrand. I am interested in conducting research to investigate the effectiveness of metacognitive intervention on reading comprehension among Grade Six learners. Research in this area has potential implications for improving our knowledge of thinking skills, as well as the use of strategies when reading text material, which would assist us in better management of their literacy development.

I am requesting your permission to work with the Grade Six learners from your school, as well as to access their school records as needed. If permission is granted, the relevant staff and parents will be briefed about the research and the process that it will follow by the researcher. Those parents indicating a willingness to participate in the study will be required to sign a consent form, following a group meeting. The learners will also be provided with a simplified explanation of what the study is about and they will be asked to provide assent that they agree to participate in this study.

If the learners, with parent consent are willing to participate in this study, the researcher / assistant will meet with learner individually for an hour, to complete a cognitive assessment activity and a language activity at another time, as arranged with the school. The reading comprehension evaluation will be conducted as a group for an hour and half on another day. These tasks will occur at the beginning, middle and end of the year with the same duration of time required for each assessment, according to the schools arrangements.

In addition, metacognitive strategies to enhance thinking and application to learning will be provided for all learners in this grade, with group one in the first half of the year and group two in the second half of the year. Their feedback will be obtained at each testing, three times in the
year, to assist the researcher in better understanding the learners’ processing of the strategy instruction.

Participation in this study is voluntary, and parents will be under no obligation. If parents choose for their children to not participate, or wish to withdraw at anytime, they will not be disadvantaged in any way. All learners will be given the intervention, as it is ethically required. Responses are strictly confidential and the learner’s identity will only be known to the researcher. The overall findings will be available to the school, for discussion at the end of the study. For further clarification, you may contact me on 083 284 8215 or at Sharon.moonsamy@wits.ac.za

Your co-operation in this study would be greatly appreciated.

Yours sincerely,

Sharon Moonsamy (Researcher)
APPENDIX: D

Principal Information and Permission Form: Control school

Dear Principal:

My name is Sharon Moonsamy and I am a PhD student in Speech Pathology at the University of the Witwatersrand. I am interested in conducting research to investigate the effectiveness of metacognitive intervention on reading comprehension among Grade Six learners. Research in this area has potential implications for improving our knowledge of thinking skills, as well as the use of strategies when reading text material in these learners, which would assist us in better management of their learning.

I am requesting your permission to work with the Grade Six learners from your school. If permission is granted, the relevant parents will be briefed about the research and the process that it will follow by the researcher. Those parents indicating a willingness to participate in the study will be required to sign a consent form. The learners will also be provided with a simplified explanation of what the study is about and they will be asked to provide assent that they agree to participate in this study.

If the learners, with their parents/guardians consent, are willing to participate in this study, the researcher/assistant will meet with learner individually for an hour, to complete a cognitive assessment activity. In addition, a language test will be conducted only at the beginning of the year, to indicate a baseline of functioning.

The reading comprehension evaluation will be conducted as a group for an hour and half on another day, as arranged with the school. The cognitive and reading tasks will occur at the beginning, and end of the year with the same duration of time required for each assessment.
Your school will form the comparison assessment school and intervention in a form of educator workshops will be offered in the year following the study.

Participation in this study is voluntary, and parents will be under no obligation. If parents choose for their children to not participate, or wish to withdraw at anytime, they will not be disadvantaged in any way. Responses are strictly confidential and the learner's identity will not be known to anyone except the researcher. The overall findings will be available to the school, for discussion at the end of the study. For further clarification you may contact me on 083 284 8215, or at Sharon.moonsamy@wits.ac.za.

Your co-operation in this study would be greatly appreciated.

Yours sincerely,

Sharon Moonsamy (Researcher)
E: Responses from Schools
Dear Sharon

Permission is hereby granted for the sample of Grade Six learners whose parents have granted consent to be recruited from this school, to be participants in this research project.

Our school would also like to be included in the Cognitive Enrichment Training Programme, which will be presented to selected staff at no cost, on completion of the study.

Mrs. K. Perchtold
Principal

Signature: [Signature]

Date: November 2007

Mrs. S. Moonsamy
Researcher

Signature: [Signature]

Date: November 2007
Dear Sharon

Permission is hereby granted for the sample of Grade Six learners whose parents have granted consent to be recruited from this school, to be participants in this research project.

Our school would also like to be included in the Cognitive Enrichment Training Programme, which will be presented to selected staff at no cost, on completion of the study.

Mrs C Donald
Principal

Signature: ________________________________ Date: 30 November 2007

Mrs S Moonsamy
Researcher

Signature: ________________________________ Date: 30 November 2007
F: Consent Letter – Parents
APPENDIX: F

Parent Information and Consent Form:

Cover Letter

Dear Parent/Guardian

My name is Sharon Moonsamy and I am a PhD student in Speech Pathology at the University of the Witwatersrand. I am conducting research to investigate the effectiveness of metacognitive intervention on reading comprehension among Grade Six learners. Research in this area has potential implications for improving our knowledge of thinking skills, as well as the use of strategies when reading text material, which would assist us in better management of learning.

I am inviting your child to participate in this study. As part of the study, I would need to gain access to your child’s school records to validate information, as well as to meet with him/her for approximately two hours at a time that is convenient for the learner and the school. The learner will also be consulted for his/her permission.

The learner individually will work on a cognitive assessment activity and a language test for an hour each, at separate times, arranged with the school’s permission. A reading comprehension task will also be conducted, as a group on another day. The cognitive and reading tasks will occur at the beginning, middle and end of the year with the same duration of time required for each evaluation. In addition, metacognitive strategies to enhance thinking and application to learning will be provided for all learners in this grade, with group one in the first half of the year and group two in the second half of the year. Their anonymous feedback will be obtained at each testing, three times in the year, to assist the researcher in better understanding the strategy instruction process.
Participation in this study is voluntary, and you and your child will be under no obligation. If you or your child chooses not to participate, or wish to withdraw at anytime, you will not be disadvantaged in any way. Responses are strictly confidential and your child’s identity will not be known to anyone except the researcher. All data collected will be destroyed on completion of the study. Results of the study will be shared with you at a prearranged time once the study is completed. For further clarification, you may contact me on 083 284 8215 or at Sharon.moonsamy@wits.ac.za

I appreciate your taking the time to read this letter.

Yours sincerely,

Sharon Moonsamy

(Researcher)
Declaration:
I have fully explained the procedures of this study and its purpose. I have asked whether any questions have arisen regarding the procedures and have answered these questions to the best of my ability.

Researcher: ____________________  Date: ____________________

Signature: ____________________

I have been fully informed as to the procedures that will be followed in this study. In signing this consent form, I agree to allow my child to participate in this study. I understand that I am free to refuse to participate or withdraw my consent and discontinue my child’s participation in this study at anytime. I am aware that if I have any queries I will be allowed to verbalise them. In addition, the results of the study will be discussed at a prearranged time.

Parent: ____________________  Date: ____________________

Signature: ____________________

Permission Slip: (Delete that which is inapplicable)

I ____________________ give permission/ do not give permission, for my child ____________________, to participate in this study.

Signature: ____________________  Date: ____________________

Contact Number/s ________________________________________________
G: Assent Letter- Learners
APPENDIX: G

Information Sheet and Assent of the Participant:

Hello, my name is Sharon and I am a Speech Therapist. I work at Wits university and I am doing this project, which I would like you to be part of. My project is about how learners use thinking strategies when doing their school tasks. If you agree to join the project, you will be introduced to and encouraged to use thinking strategies in activities at school and at home.

This is not for marks and you do not have to take part if you do not wish to.

Will you help me with my project?

Yes, I wish to be part of Sharon’s project.

Name: ___________________________ Date: ___________________________

Signature: ___________________________
H: Biographical Questionnaire
APPENDIX: H

Biographical Questionnaire for educators and parents

1. Details:

Name: ___________________  Surname: ___________________

Age: ___________________  D.O.B.: ___________________

2. Please indicate your child's language proficiency. List in order of proficiency.

Put a 1 next to the first language etc,

<table>
<thead>
<tr>
<th>Language</th>
<th>Understood</th>
<th>Spoken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afrikaans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sotho</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tswana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zulu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Educational levels of Parents

Mother____________________

Father____________________
4. School History

- Name / Names of school attended and years attended:

  ____________________________  ____________________________

  ____________________________  ____________________________

- How many years of exposure to English as the primary medium of instruction at school has your child received?

<table>
<thead>
<tr>
<th>0 -2 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5 years</td>
</tr>
<tr>
<td>Over 5 years</td>
</tr>
</tbody>
</table>

- How would you rate your child’s academic progress?

<table>
<thead>
<tr>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfactory</td>
</tr>
<tr>
<td>Fair</td>
</tr>
<tr>
<td>Less than adequate</td>
</tr>
</tbody>
</table>

- Please list your child’s scholastic areas of strength and weakness:

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
- Please indicate whether your child has attended any Learning support, extra lessons or therapy

<table>
<thead>
<tr>
<th>Type</th>
<th>Length of Input</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please include any additional comments that you feel may be valuable:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Thank you for your participation
I: Baseline Learner Questionnaire
Feedback Questionnaire: Pre-; Mid- and Post –testing

A reading comprehension activity will be presented to each group. Learners will be instructed to complete the questionnaire if such a hypothetical activity was presented to them.

Reading activity

1. From this list of strategies, tick only the ones you would normally use in completing the above activity.

<table>
<thead>
<tr>
<th>Strategies</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-reading</td>
<td></td>
</tr>
<tr>
<td>Under line key words</td>
<td></td>
</tr>
<tr>
<td>Read questions first</td>
<td></td>
</tr>
<tr>
<td>Self-regulation</td>
<td></td>
</tr>
<tr>
<td>Talk alouds</td>
<td></td>
</tr>
<tr>
<td>Systematic exploration</td>
<td></td>
</tr>
<tr>
<td>Systematic planning</td>
<td></td>
</tr>
<tr>
<td>Contextual Clues</td>
<td></td>
</tr>
<tr>
<td>Selective attention</td>
<td></td>
</tr>
<tr>
<td>Thought integration</td>
<td></td>
</tr>
<tr>
<td>Visualising</td>
<td></td>
</tr>
</tbody>
</table>

2. Record other strategies that you use which are not listed

__________________________
__________________________
3. Do you find these strategies helpful? Say Why

4. Name any two activities at home / school /with friends, where you can also use these strategies.

Thank you for your participation
J-K: Sentence Completion Task 1

Sample of Response Sheet
APPENDIX: J-K

Feedback Questionnaire: Intervention Phase

1. Explain in your own words what the following words mean:

a. Self Regulation:

b. Systematic Exploration:

c. Systematic Planning:
2. Complete the sentence:

   a. If I use Self Regulation effectively then I will

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

   b. If I use Systematic Exploration effectively then I will

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

   c. If I use Systematic Planning Regulation effectively then I will

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

3. Name two activities you could use these strategies in:

   ________________________________________________________________
   ________________________________________________________________

Thank you for Your participation
1. Explain in your own words what the following words mean:
   
a. Self Regulation:  
   self regulation is when you don’t let yourself be distracted, when you are doing work, for example, you just try to get to finish your task.

b. Systematic Exploration:  
   exploration is when you try to find answers for something, your goal is to find out about the task you are doing.

c. Systematic Planning:  
   planning is when you plan ahead, or if you plan a project, your project would have better and you get better results.

2. Complete the sentence:

   a. If I use Self Regulation effectively then I will 
      be able to get through tasks more easily and the evaluation that I have will be better.

   b. If I use Systematic Exploration effectively then I will 
      be able to find out just what I want to know; I will be able to complete the task successfully.

   c. If I use Systematic Planning Regulation effectively then I will 
      be able to plan well, and I will get a better outcome in whatever I am doing.

3. Name two activities you could use these strategies in:

   if you were doing group work, when I am doing homework.

Thank you for Your participation
L –M: Sentence Completion Task 2
+
Sample of Response Sheet
APPENDIX: L-M

Feedback Questionnaire: Intervention Phase

1. Explain in your own words what the following words mean:
   
   a. Selective Attention:
      __________________________________________________________
      __________________________________________________________
      __________________________________________________________
      __________________________________________________________
      __________________________________________________________
      __________________________________________________________
   
   b. Thought Integration:
      __________________________________________________________
      __________________________________________________________
      __________________________________________________________
      __________________________________________________________
      __________________________________________________________

2. Complete the sentence:
   
   a. If I use Selective Attention effectively then I will
      __________________________________________________________
      __________________________________________________________
      __________________________________________________________
b. If I use Thought Integration effectively then I will


3. Name two activities you could use these strategies in:


Thank you for Your participation
1. Explain in your own words what the following words mean:

   a. Selective Attention:
      Selective attention is when you are able to do things without being distracted. You can also concentrate on one thing harder.

   b. Thought Integration:
      Thought integration is when you can focus your thinking on different things.

2. Complete the sentence:

   a. If I use Selective Attention effectively then I will be able to ignore noises around me while I'm doing an important activity.

   b. If I use Thought Integration effectively then I will achieve higher goals because I will be able to concentrate with my thoughts in both academics and sports (that you need to concentrate in).

3. Name two activities you could use these strategies in:

   Homework and schoolwork - comprehension.

Thank you for your participation
N-O: Parent Questionnaire

+ 

Sample Response Sheet
APPENDIX N: Parent Feedback

Dear parent

Please fill in the columns using the scale as explained:

1 – never; 2 – rarely; 3 – sometimes; 4 – mostly; 5 – always

1. Does your child share information on the intervention program? __________

2. Can they describe the strategies learnt? __________

3. Does your child apply strategies learnt to solve problem situation? __________

4. Does your child use the skill of planning when executing a task? __________

5. Have you note your child asking more questions? __________

6. Is your child less impulsive, taking more time to think? __________

7. Does your child talk his/her thoughts aloud while doing a task? __________

8. Do they indicate that they focus on what is relevant to reach a goal? __________

9. Do they consider all possibilities before they answer? __________

10. Give an example of your child applying his thinking effectively
Thank You for Your participation
APPENDIX N-O: Parent Feedback

Dear parent

Please fill in the columns using the scale as explained:

1 – never; 2 – rarely; 3 – sometimes; 4 – mostly; 5 – always

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<td>9. Do they consider all possibilities before they answer?</td>
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</tr>
<tr>
<td>10. Give an example of your child applying his thinking effectively</td>
<td></td>
</tr>
</tbody>
</table>
Thank You for Your participation
Dear parent

Please fill in the columns using the scale as explained:

1 – never; 2 – rarely; 3 – sometimes; 4 – mostly; 5 – always

1. Does your child share information on the intervention program? 4
2. Can they describe the strategies learnt? 4
3. Does your child apply strategies learnt to solve problem situations? 4
4. Does your child use the skill of planning when executing a task? 4
5. Have you noted your child asking more questions? 2
6. Is your child less impulsive, taking more time to think? 4
7. Does your child talk his/her thoughts aloud while doing a task? 4
8. Do they indicate that they focus on what is relevant to reach a goal? 4
9. Do they consider all possibilities before they answer? 4
10. Give an example of your child applying his/her thinking effectively

He carefully considers what is required of him, does research and does the task at hand to the best of his ability.

Thank You for your participation
P-Q: Teacher Questionnaire
+
Sample Response Sheet
APPENDIX: P: Educator Feedback

Dear Educator

Please fill in the columns using the scale as explained:

1 – never; 2 – rarely; 3 – sometimes; 4 – mostly; 5 – always

1. The learners use the labels to describe the strategies learnt

2. The learners show an understanding of the strategies learnt

3. The learners indicate application of strategies learnt to solve problem situation?

4. The learners engage more effectively in oral Tasks

5. The learners are asking more questions

6. The learners are generally less impulsive, taking more time to think

7. Learners talk their thoughts aloud while doing a task

8. Learners indicate that they focus on what is relevant to reach a goal

9. Learners consider all possibilities before they answer

10. The learners apply the strategies when doing written tasks
11. The strategies are generalised to other subjects

12. Give an example of your learner/s applying their thinking effectively

Thank You for Your participation
APPENDIX: Q

Educator’s observation during intervention programme

Please write comments under the following headings. You may include additional paper if the spacing is limited. Whether a response is a ‘yes’ or ‘no, do substantiate your response, so that a clearer understanding of the learners’ behaviours within the context is achieved.

1. Learners’ participation in the session.

2. Are the questions the learners ask, relevant to the content and context of this session?
3. Note types of questions, giving examples?

4. Do the learners display strategies to assist them with processing and recall of information?

5. Do the learners show an ability to integrate new information with information previously introduced in this programme?

6. General comments

Thanking you for your observation notes
Dear Educator

Please fill in the columns using the scale as explained:

1 – never ; 2 – rarely ; 3 – sometimes ; 4 – mostly ; 5 – always

1. The learners use the labels to describe the strategies learnt

2. The learners show an understanding of the strategies learnt

3. The learners indicate application of strategies learnt to solve problem situations

4. The learners engage more effectively in oral tasks

5. The learners are asking more questions

6. The learners are generally less impulsive, taking more time to think

7. Learners talk their thoughts aloud while doing a task

8. Learners indicate that they focus on what is relevant to reach a goal

9. Learners consider all possibilities before they answer

10. The learners apply the strategies when doing written tasks

11. The strategies are generalised to other subjects at school

12. Give an example of your learner/s applying their thinking effectively

Programme was run last tea term using the 6th class when comparing comprehension results of the last exam this class performed better than the 2 other classes. This is usually not the case.

Thank You for your participation
3. Teacher reports

July 2008:

Mostly:
The learners use the labels to describe the strategies most of the time.
The learners show an understanding of the strategies learnt
The learners are generally less impulsive, taking more time to think
Learners talk their thoughts aloud while doing a task
The strategies are generalised to other subjects at school

Always:
The learners indicate application of strategies learnt to solve problem situations
The learners engage more effectively in oral tasks
The learners are asking more questions
Learners indicate that they focus on what is relevant to reach a goal

Sometimes:
Learners consider all possibilities before they answer
The learners apply the strategies when doing written tasks

Give an example of your learner/s applying their thinking effectively

The programme was run during the first six months only with 6H. This class performed better than the other two classes on comprehension results. This is usually not the case. The exam included more inferential questions which are more taxing on the learners. Teacher also noted changes in the class as a whole. They are generally more disruptive as a group but changes in performance were noted. One particular child performed better and this was a child who they were mainly concerned about his disruptive behaviour. [See focus group- this student indicated that he used self regulation and did better in his exams] This tied in with the teacher’s observation.
Teacher Feedback 8 Dec 08

Both classes use the terms and apply the strategies but they do need to be reminded. Spontaneous use is not always evident currently. Ethos of this class shows a willingness to work together. At the beginning of the year G1 had difficulty forming a cohesive group but that changed. These classes show a competitive spirit and general knowledge is good. Teacher indicated that teaching English to these groups was highly motivating. 6k difficult to explore as the programme was conducted in the second term. 6H seemed to have responded better than 6K. Although 6 K is a brighter class they did not show the same response. Teacher felt that she learnt from being involved in the programme. Concepts may be implicit but not always explicit when teaching. However the programme has explicit reference to the strategies.

English curriculum:
Questions must be graded and learning outcomes must be achieved. Eng – level 1 = read for information; level 2= explanation; level 3 = more abstract reasoning. Evert test must have a level 3 quest. 10-15% of the exam must have level3 / abstract reasoning questions. Teacher revises after a test to show class where they can improve.
R-S: Focus Group Interviews

+

Learner Responses
Three Focus groups Beginning, mid and final year

Questions:

30 Jan 2008:

1. You were given a hypothetical reading comprehension in the individual interview and strategies to do your best were discussed. Before we look at those strategies, can you tell me who encourages your thinking and where does this happen?
2. What strategies are encouraged at school?
3. Have you heard of any of these strategies: Self-Regulation, thought integration, Selective attention, exploration, planning, visualization, and re-reading, underlining key words?
4. Tell me more about the ones you’re familiar with.
5. Are these strategies useful and why?
6. Are there any other activities that you can use these strategies, name them?
7. How do strategy use different in individual use versus group use?
8. Is there a difference in strategy use in text versus conversation?
9. Have you become more aware of strategy use since the first interview and are you applying them more consciously?

11 June 2008

1. Have you been encouraged to use thinking strategies?
2. Why do you think that these subjects need more thinking than others?
3. Do you not think reading requires thinking?
4. Who encourages thinking for you?
5. What strategies are encouraged?
6. Why is thinking strategies important?
7. When you read, what strategies do you now use?
8. What can change in your classroom?

26 November 2008

1. Have you been encouraged to use your thinking strategies that you have learnt at school, by your teacher or parents?
2. Have you shared these ideas with other, why or why not? If Yes how?
3. Do you think that we could encourage thinking further, How?
4. What do you think of the names or terminology that you learnt?
5. How do you think that you can remind yourself of the thinking blocks and tools that you have learnt?
3. Do you think that we could encourage thinking further, How?

6K: L2- Yes next year the work is more demanding and we need to work towards high school.
L4- Also to reach our goals, to practice thinking for next year and the future;
L3- Teacher to show us our marks and assist us in improving our outcomes.
L5- Teachers to encourage learners to do better. Also to help the learners to discover how
to do better.
L7- How to balance lessons and homework.
L3- Also to make teaching interesting because it’s not fun.
L2- Teachers should encourage participation and not limit thinking when they mark exams or tests.
L1- Teachers should build self-esteem and approach the learners with respect.

6H:- L4- Encourage thinking skills in exams. Think about the consequences.
L6- Thinking skills should be ongoing, to help learners in exams so that they could do better at the end of the year.
L5- Able to control thinking better in the final exams.
L3- Also so that grade sixes could share their opinions in a more mature way.
L2- Lessons can be in groups and in more fun ways.
L6- Learners also can share their opinions and be part of the class.
L3- Learners need to have a chance to share their ideas and to be encouraged to participate.
L5- To include all learners without ignoring some.
L6- Also to do thinking skills more frequently so that the learners get used to using them.

4. What do you think of the names or terminology that you learnt?

6K: L4- If the names are explained they can be remembered.
L3- Need to start early in preschool so that it becomes part of our learning.

6H: L6- use names or words that are familiar use rhymes so that the names can be recalled.

5. How do you think that you can remind yourself of the thinking blocks and tools that you have learnt?

6K: L1- Keep the thinking skills more frequent,
L4- on-going review.
L2- Revise at the beginning of the New Year, so that it will assist in their learning.
L5- Also group discussion because we use thinking in the groups

6H: L6- The poster in class can remind us to use the terms.
L7- Use the names of the blocks and tools.
L4- The posters need to be more evident and need to be included in class.
L3- Teachers need training workshops so that they too can learn about thinking skills.
L1- Learners to make posters of these thinking skills it will add to their learning.
T: Permission Letter- Prof Greenberg
APPENDIX: T

Permission from Greenberg

From: Greenberg, Katherine H [khgreen@utk.edu]
Sent: 30 July 2007 11:19 PM
To: Sharon Moonsamy

Subject: RE: South Africa CEA

Hi, Sharon. It is good to hear from you! I am so pleased to learn of your use of CEA. Some colleagues and very experienced users of CEA in east Tennessee are joining with me to complete a 3rd edition of the books, along with new materials. I hope to keep you informed.

As of now, I own the copyright for all CEA materials. I hereby grant you permission to use the BBs and Ts in your dissertation research. I am excited about your project and hope you will send me an electronic version when you finish. Please contact me if I can help in any way as you proceed. I hope your passage with this dissertation is a truly enriching one.

be well,

Kathy Greenberg
U-V: Blocks of Thinking

+ 

Tools of Learning
FIGURE 3.6

CEA Building Blocks of Thinking

Building Blocks for Approaching the Learning Experience

- Exploration
- Planning
- Expression

Building Blocks for Making Meaning of the Learning Experience

- Working Memory
- Making Comparisons
- Getting the Main Idea
- Thought Integration
- Connecting Events

Building Blocks for Confirming the Learning Experience

- Precision and Accuracy
- Space and Time Concepts
- Selective Attention
- Problem Identification
FIGURE 3.7

CEA Tools of Learning

Tools for Understanding Feelings within the Learning Experience

- Inner Meaning
- Feeling of Challenge
- Awareness of Self-Change
- Feeling of Competence

Tools for Motivating Behavior within the Learning Experience

- Self-Regulation
- Goal Orientation
- Self-Development
- Sharing Behavior
W-X: Symbols for CEA Metacognitive Concepts
+
Sample of Fridge Page
Selective Attention
Focus on relevant information
Self-Regulation
Reflect on thoughts and actions
Thought Integration
Combine pieces of information
Planning

Use an organized approach
Exploration
Gather information systematically
Selective Attention

Definition
To choose between relevant and irrelevant information and to focus on the information needed in the learning experience

Sample Bridging Principles Based on Essential Parts
If I use Selective Attention to confirm a learning experience, then I will
- decide what information is important to think about,
- decide what information is not important to think about,
- focus on all relevant information,
- ignore irrelevant information.

Examples of Family Activities that Benefit from Use of Selective Attention
- studying with lots of family noise
- writing a report for homework and looking for relevant information in books
- grocery shopping and getting only what's on the grocery list
- selecting an appropriate movie for the family to see
- cleaning the house before company comes
- making a bed properly
- playing a game of strategy
- practicing sports skills

This Building Block is important in all learning experiences. Too many bits of information are always available in any situation. It is necessary to select some of this information and focus attention there. To learn effectively, learners must determine what information is important, or relevant, in the situation, then focus attention on the relevant information.

To decide what is relevant information, learners must know the purpose of the learning experience. If the purpose changes, the relevant information may also change. For example, when watching a football game, many people like to yell out suggestions to their team. The team's problem areas determine the relevant information fans supply. If the team is scoring well when they have the ball, but the defense is not stopping the other team's advance, then advice focuses on defense, and the actions of certain defense players become most relevant. If the team is keeping the other team scoreless but remains scoreless as well, the advice focuses on offense.

Even those learners with attention deficit problems can improve their ability to use Selective Attention by understanding how to use it to build learning strategies that can help. Learners need to use Selective Attention along with other Building Blocks and Tools, especially Self-Regulation. Even highly distractible students have been observed as capable of paying attention to the teacher and ignoring such distractions as hallway noise when reminded to use Selective Attention.

Learning at School and Selective Attention
Classrooms contain many distractions for students. To learn successfully, they must learn to use Selective Attention effectively. While teachers can observe whether students are focusing attention on relevant information, they have more difficulty knowing whether students have trouble determining what is relevant, especially if the student appears to pay attention to the right person.
or material. In addition, it is common for one student to answer for the others. The rest of the students may pay attention to the response given by one, or they may not. This provides less assurance that students have really learned to use Selective Attention.

Family mediators can help teachers understand when a student has difficulty determining what is relevant. They can also mediate Selective Attention on a frequent basis and in a way that ensures students think for themselves.

Family Mediated Learning: Name that Tune

Jerry’s mother asked his older sister, Beth, to get him away from the TV set. Beth wanted to play her guitar and decided a game might meet both needs. “Hey, Jerry,” said Beth, “let’s play a game. How about if I play a song and you try to guess what it is?” She turned off the TV.

“Well, maybe,” said Jerry as he turned the TV back on.

Beth sat down with her guitar. She played three different songs that Jerry knew, but he could not name any of them. Beth thought about what to do. “I know, Jerry. Let’s try using Selective Attention. What information do you need to focus on to name the songs I play?”

“Hmmmm,” said Jerry, “the notes and the rhythm?”

“Good! You really know what the important information is. Now, what information is not important and won’t help you guess the songs I play but is trying to get your attention?” asked Beth.

“Well, how loud you play isn’t important. How well you play is and isn’t important, depending on how much you goof up. And the TV doesn’t help.”

“So shall we turn the TV off?” asked Beth as she reached for the remote control.

“Just for awhile,” said Jerry, laughing.

**TIP**

Tip: Notice Jerry’s sister does not insist that he participate exactly her way. She gets his attention without trying to force it.

**Bridging Selective Attention**

**Beginning Bridging**

Until bridging becomes comfortable for all family members, use the beginning bridging approach. If ready for advanced bridging, make a copy of the advanced bridging worksheet in the Appendix and use it. An example of Jerry’s use of advanced bridging appears below. The steps for beginning bridging follow:

1. Talk about this bridging principle with your child: **If I use Selective Attention, then I will be able to confirm learning experiences more effectively.** Ask questions such as “Why do you think this principle is important?” “How does using Selective Attention help people be more effective learners?”

2. Help the child think of examples of using Selective Attention to apply the principle in home events and school events. Ask the child to describe specific situations and share how to use the principle in those situations.

**Advanced Bridging: Jerry’s Worksheet**

1. Describe a strategy for Selective Attention you used today.

   * * *
   
   I listed the important information I need to name tunes, and I named the unimportant information.
   
   * * *

2. Use your strategy to think of a bridging principle that can help in other learning experiences. See the refrigerator page for this Building Block or Tool for sample principles. Write the principle here.

   * * *
   
   If I use Selective Attention effectively, then I will decide what is important information.
   
   * * *

3. Share two examples of how you can apply this principle to school events.

   * * *
   
   Knowing whether to add or subtract by focusing on important information in a math story problem
   
   Knowing the answer to the teacher’s questions by paying attention to information she includes in the question
4. Share an example of how you can use this principle in events in your own family.

*When sorting socks, the important information is size, style, and color.*

5. Think about a classmate whose family comes from a culture different from yours. How might your classmate use this principle in events in his or her family? If you don't know, ask that classmate or read a library book about people from other cultures.

*People who live in a very hot climate must select shoes by paying attention to information about how to keep their feet cool and how well the shoes protect their feet from the hot pavement.*

---

**Family Reflection Checklist for Selective Attention**

Use this form every few weeks. If most of the statements do not describe your child, see Section 2 for recommendations on how to help your child.

Child's name ___________________ Date _____________

Family member's name ___________________

☐ 1. My child uses the name for the Building Block of Selective Attention in conversations with me.

☐ 2. My child decides what is relevant and irrelevant information in a learning experience.

☐ 3. My child focuses attention on relevant information.


☐ 5. My child changes or adapts strategies for using Selective Attention that are not working well.

☐ 6. My child can share with me how he or she is using Selective Attention at school.

☐ 7. My child asks questions about how other people use the Building Block of Selective Attention.
Y-Z: Histograms

+

Goodness of Fit Tests
### Distribution analysis of: Apere_Total, Plantott1, simott1, attott1, cultott1

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<tbody>
<tr>
<td>Kolmogorov-Smirnov</td>
<td>D</td>
<td>0.0762</td>
<td>0.05</td>
</tr>
<tr>
<td>Cramer-von Mises</td>
<td>W</td>
<td>0.1653</td>
<td>0.05</td>
</tr>
</tbody>
</table>

#### Quantiles for Normal Distribution

<table>
<thead>
<tr>
<th>Percent Quantiles</th>
<th>Observed</th>
<th>Estimated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>42.0000</td>
<td>42.0000</td>
</tr>
<tr>
<td>5%</td>
<td>46.0000</td>
<td>46.0000</td>
</tr>
<tr>
<td>10%</td>
<td>50.0000</td>
<td>50.0000</td>
</tr>
<tr>
<td>25%</td>
<td>59.0000</td>
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</tr>
<tr>
<td>50%</td>
<td>68.0000</td>
<td>68.0000</td>
</tr>
<tr>
<td>75%</td>
<td>77.0045</td>
<td>77.0045</td>
</tr>
<tr>
<td>90%</td>
<td>86.0000</td>
<td>86.0000</td>
</tr>
<tr>
<td>95%</td>
<td>90.0000</td>
<td>90.0000</td>
</tr>
</tbody>
</table>

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### Distribution analysis of: Apere_Total, Plantott1, simott1, attott1, cultott1

#### The UNIVARIATE Procedure

#### Fitted Normal Distribution

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Distribution</th>
<th>Value</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>55.1656</td>
<td>Normal</td>
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<td>Normal</td>
</tr>
<tr>
<td>Std Dev</td>
<td>13.5925</td>
<td>Normal</td>
<td>13.5925</td>
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</tr>
<tr>
<td>Skewness</td>
<td>0.4561</td>
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</tr>
<tr>
<td>Kurtosis</td>
<td>-0.9462</td>
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</tbody>
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#### Goodness-of-fit Tests for Normal Distribution

<table>
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### Distribution analysis of: Apere_Total, Plantott1, simott1, attott1, cultott1

#### The UNIVARIATE Procedure

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Distribution analysis of: Apero_Total, Plantoff, simoff1, att boilers, succotail
The UNIVARIATE Procedure

### Timel1

#### Baseline Statistics

- **Location**: Variability
  - Mean: 128.7800
  - Std Dev: 58.9610

#### Goodness-of-Fit Tests for Normal Distribution

- **Test**: Shapiro-Wilk
  - Statistic: 0.972
  - p-Value: 0.012

### Timel2

#### Goodness-of-Fit Tests for Suffix1

- **Test**: Shapiro-Wilk
  - Statistic: 0.972
  - p-Value: 0.012
Fitted Normal Distribution for Nov_Exams

Parameters for Normal Distribution

Parameter Statistic Estimated
Mean 24.54713
Std Dev 8.023129

Goodness-of-Fit Tests for Normal Distribution

Test Statistic p Value
Kolmogorov-Smirnov 0.12037 0.518
Cramer-von Mises W = 0.04892 0.206
Anderson-Darling A = 0.04340 0.829

Quantiles for normal distribution

Quantile Percent Observed Estimated
1.0 4.00000 15.1596
5.0 15.00000 14.4909
10.0 16.00000 18.5554
25.0 21.00000 22.4471
50.0 26.00000 24.0447
75.0 28.00000 28.8480
90.0 32.00000 32.0299
95.0 33.0000 34.9916
99.0 35.00000 32.1356

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Distribution analysis of: June_Exams, Nov_Exams, CDrs, CDses, FScs, FSSas, Wa
The UNIVARIATE Procedure

Variables: CDrs

Basic Statistical Measures

Location Variability
Mean 13.697108 Variance 116.2467
Median 15.000000 Range 31.9083
Mode 15.000000 Interquartile Range 16.9990

Basic Confidence Limits Assuming Normality
Parameter 95% Confidence Limits
Mean 23.67372 23.73218 28.66025
Std Deviation 4.2716 3.7032 5.94830

Tests for Location: Median

Test Statistic p Value
Students’ t 3.03257 0.005

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Distribution analysis of: June_Exams, Nov_Exams, CDrs, CDses, FScs, FSSas, Wa
The UNIVARIATE Procedure

Variables: CDrs

Basic Statistical Measures

Location Variability
Mean 24.600000 Variance 70.6689
Median 25.500000 Range 21.1960
Mode 26.000000 Interquartile Range 12.9990

Basic Confidence Limits Assuming Normality
Parameter 95% Confidence Limits
Mean 24.600000 24.5700 24.6300
Std Deviation 2.85423 2.7352 3.00125

Tests for Location: Median

Test Statistic p Value
Students’ t 4.27159 0.000

Generated by the SAS System (Local, XP_PRO) on May 24, 2011 at 11:39:25 AM

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Test Statistic p Value
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### Basic Statistical Measures

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>38.35000</td>
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<tr>
<td>Std Dev</td>
<td>9.22557</td>
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<td>Median</td>
<td>38.00000</td>
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<tr>
<td>Mode</td>
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<tr>
<td>Interquartile Range</td>
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</tbody>
</table>

### Fitted Normal Distribution for Fsse

<table>
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<tr>
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<th>Value</th>
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<tbody>
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<td>Mean</td>
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<td>Sigma</td>
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### goodness-of-fit Tests for Normal Distribution

<table>
<thead>
<tr>
<th>Test</th>
<th>Statistic</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson-Darling</td>
<td>0.0731764</td>
<td>0.0964</td>
</tr>
<tr>
<td>Cramer-von Mises</td>
<td>0.1986905</td>
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</tr>
<tr>
<td>Kolmogorov-Smirnov</td>
<td>0.2137069</td>
<td>0.1623</td>
</tr>
</tbody>
</table>

### Quantiles for Normal Distribution

<table>
<thead>
<tr>
<th>Percent</th>
<th>Observed</th>
<th>Estimated</th>
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</thead>
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<tr>
<td>1.0</td>
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<tr>
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### Distribution Analysis

#### Distribution Analysis of June_Exams, Nov_Exams, CDrs, CDss, FSr, FSs, We, Wa

The **UNIVARIATE** Procedure

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#### Distribution Analysis of June_Exams, Nov_Exams, CDrs, CDss, FSr, FSs, We, Wa

The **UNIVARIATE** Procedure

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#### Distribution Analysis of June_Exams, Nov_Exams, CDrs, CDss, FSr, FSs, We, Wa

The **UNIVARIATE** Procedure