MULTIPLE INTELLIGENCE PROFILES OF LEARNERS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD)

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MULTIPLE INTELLIGENCE PROFILES OF LEARNERS WITH ATTENTION-DEFICIT / HYPERACTIVITY DISORDER (ADHD)

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LETTERS OF CONFIRMATION

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Hiermee word bevestig dat Statistiese Konsultasiediens die data verwerk het en ook betrokke was by die interpretasie van die resultate.

Vriendelike groete

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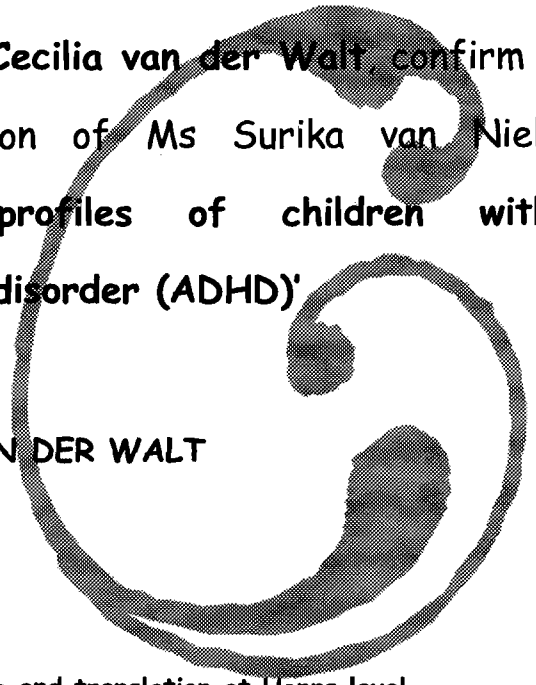
Hereby I, Ms **Cecilia van der Walt**, confirm that I did the editing of the dissertation of Ms Surika van Niekerk, entitled '**Multiple Intelligence profiles of children with Attention Deficit/ Hyperactivity disorder (ADHD)**'



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SUMMARY

Although Attention-Deficit/Hyperactivity Disorder (ADHD) is one of the most prevalent childhood disorders, occurring in about three to five percent of the school-going population, there is a dearth of information in literature concerning ADHD learners' intellectual strengths and weaknesses and concomitant learning preferences. An abundance of literature sources can, however, be traced dealing with ADHD learners' behavioural and scholastic problems. Because of this predominantly negative focus on ADHD, these learners are often misunderstood and didactically neglected by teachers in regular classrooms.

In 1983, Howard Gardner proposed a new model for understanding intelligence, namely the *Theory of Multiple Intelligences* (MI). He stated that a person can be intelligent in more than one way and identified eight intelligences, namely linguistic-verbal, logical-mathematical, visual-spatial, musical, bodily-kinaesthetic, interpersonal, intrapersonal and naturalist.

MI theory provides teachers with a positive model for understanding, supporting and accommodating ADHD learners better in classrooms.

The aims of the research were to determine:

- what the MI profiles of ADHD learners reveal in terms of their intellectual strengths and weaknesses;
- whether the MI profiles of ADHD and non-ADHD learners differ significantly; and
- what the implications of ADHD learners' MI profiles are for their teaching and learning.

With a view to achieve these aims, a literature study and an empirical investigation were undertaken. The literature study focussed on ADHD, MI theory and its implications for the teaching and learning of ADHD learners.

In the empirical section of the research, a self-report questionnaire (MIDAS-KIDS) was administered to a group of ADHD and non-ADHD learners who attend five Section 21

primary schools (ex-model C schools) in the D12 school district (Roodepoort) of the Gauteng Province.

The data was statistically analysed and the following findings were made:

- The MI profile of the ADHD learners revealed no visible intellectual strengths and weaknesses.
- With the exception of Writing and Reading, no differences of real practical significance were observed in the MI profiles of the ADHD and non-ADHD participants.

The following conclusions were drawn, based on these findings:

- The MIDAS-KIDS is a measure of perceived intellectual disposition and because factors such as *positive illusory bias* (PIB) may cause disparities between ADHD learners' perceived and demonstrated intellectual competence, MI profiles need to be reviewed and interpreted carefully against the backdrop of other diagnostic information when decisions are made with regard to ADHD learners' intellectual strengths and weaknesses.
- Although with the exception of Writing and Reading, no differences of real practical significance were observed in the MI profiles of the ADHD and non-ADHD learners, it is still important that teachers and other professionals take cognisance of MI theory and its application potential for the optimal intellectual development of ADHD and other learners in classrooms.

Key words: *Multiple Intelligences, Attention-Deficit/Hyperactivity Disorder (ADHD), teaching learners with ADHD.*

OPSOMMING

Hoewel Aandaggebrek/Hiperaktiwiteitsversteuring (AAHV) een van die kinderversteurings is wat die meeste voorkom, wat by nagenoeg drie tot vyf persent van die skoolgaandebevolking teenwoordig is, is daar 'n skaarste aan inligting in die literatuur rakende AAHV-leerders se intellektuele swakpunte en sterkpunte en gepaardgaande leervoorkeure. Talle literatuurbronne kan egter opgespoor word wat handel oor AAHV-leerders se gedrags- en skolastiese probleme. As gevolg van hierdie oorwegend negatiewe fokus op AAHV verstaan onderwysers hierdie leerders wat in gewone klaskamers opgeneem is, dikwels verkeerd en skeep hulle didakties af.

In 1983 het Howard Gardner 'n nuwe model vir die verstaan van die begrip *intelligensie* voorgestel, naamlik die *Teorie van Meervoudige Intelligensies* (MI) (*Theory of Multiple Intelligences* - MI). Sy opvatting was dat 'n persoon op meer as een manier intelligent kan wees en het agt intelligensies geïdentifiseer, naamlik linguisties-verbaal, logies-matematies, visueel-ruimtelik, musikaal, liggaamlik-kinesteties, interpersoonlik, intrapersoonlik en natuurlik.

Die MI-teorie voorsien onderwysers van 'n positiewe model om AAHV-leerlinge beter in die klaskamer te verstaan, te ondersteun en te akkommodeer.

Die doelwitte van die navorsing was om te bepaal:

- wat die MI-profiele van AAHV-leerders blootlê met betrekking tot hul intellektuele sterkpunte en swakpunte;
- of die MI-profiele van AAHV en nie-AAHV-leerders betekenisvol verskil; en
- wat die implikasies van die MI-profiele van AAHV-leerders vir hul onderrig en leer is.

Met die oog daarop om hierdie doelwitte te bereik is 'n literatuurstudie en 'n empiriese ondersoek onderneem. Die literatuurstudie het op AAHV, die MI-teorie en die implikasies daarvan vir die onderrig en leer van AAHV-leerders gekonsentreer.

In die empiriese gedeelte van die navorsing is 'n selfrapporteringsvraelys (MIDAS-KIDS) afgeneem op 'n groep AAHV- en nie-AAHV-leerders wat vyf Afdeling 21 primêre skole

(gewese model C-skole) in die D12-skooldistrik (Roodepoort) van die Gauteng Provinsie bywoon.

Die data is statisties ontleed en die volgende bevindings is gemaak:

- Die MI-profiel van die AAHV-leerders het geen merkbare intellektuele sterkpunte en swakpunte blootgelê nie.
- Benewens Skryf en Lees is geen verskille van wesenlik praktiese betekenis in die MI-profiele van die AAHV en nie-AAHV-deelnemers waargeneem nie.

Gegrond op hierdie bevindinge, is tot die volgende gevolgtrekkings geraak:

- Die MIDAS-KIDS is 'n maatstaf van waargenome intellektuele aanleg, en aangesien faktore soos positiewe denkbeeldige vooroordeel (PIV) ongelyksoortighede tussen ADHD-leerders se waargenome en gedemonstreerde intellektuele vermoë kan meebring, moet MI-profiele versigtig en teen die agtergrond van ander diagnostiese inligting beoordeel word wanneer besluite geneem word met betrekking tot AAHV-leerders se intellektuele sterkpunte en swakpunte.
- Alhoewel met die uitsondering van Skryf en Lees geen verskille van wesenlik praktiese betekenisvolheid by die MI-profiele van die AAHV en nie-AAHV-leerders waargeneem is nie, is dit steeds van die allergrootste belang dat onderwysers en ander professionele persone kennis moet neem van die MI-teorie en die toepassingsmoontlikheid daarvan vir die optimale intellektuele ontwikkeling van AAHV en ander leerders in klaskamers.

Sleutelwoorde: *Meervoudige Intelligensies, Aandaggebrek/Hiperaktiwiteitsversteuring (AAHV), die onderrig van AAHV-leerders.*

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CHAPTER 1
INTRODUCTION, PROBLEM STATEMENT, AIMS, METHOD AND PLAN OF RESEARCH

1.1 Introduction

A learner's potential can be compared with a rainbow (Cloete, 2005:22). Rainbows differ, depending on the amount of light and raindrops they reflect. If a rainbow is not viewed from the correct angle, some of the beautiful colours may not be seen at all.

Nelson (1998) states that Attention-Deficit/ Hyperactivity Disorder (ADHD) is usually viewed from a negative perspective and that the true potential of learners with ADHD is often underestimated. According to Gigot-Hues (2006:5) and Diller (1999), these negative perspectives and underestimations contribute to the fact that learners with ADHD are usually labelled as low achievers and/or learners who display disciplinary problems.

Howard Gardner's (1983) theory of Multiple Intelligences (MI) can make a significant contribution to changing the preponderating negative perceptions of learners with ADHD and can positively influence educators' perspectives on the teaching and learning of children with ADHD (Armstrong, 2000:57; Headley, 2007; Nolen, 2004:148).

1.2 Problem statement

"*Gilbert's parents had always known that he was very bright, and before he started school he could write his name, read books easily and understood a great deal of what was going on in the world. However, he never did well at school, and while he could put his energy into sport and other activities, where he was clearly very confident, in the classroom he was average in some subjects and below average in others. His teachers found he could concentrate really well in some subjects, like Science and Technology, but in English and Geography, he did very badly indeed. His parents and teachers noted that one day he could concentrate, especially if he is interested, the next day he loses his pencil case, forgets to pass on notes from school and takes hours to complete one page of homework. He talks incessantly at home and in class and is always*

interrupting, but these interruptions are never to the point. When he has friends around, he's the one being rowdy, not that he has many friends. His parents eventually transferred him to a private school with small class sizes and increased structure and support. Gilbert did very well for a while and was at the top of the class for the first two terms. However, he gradually slipped back to his old ways and was in the lower part of the year group. An educational psychology assessment showed he had an IQ of 140, putting him in the top 1 percent of children. Thus, he had tremendous ability." (Kewley, 2005:4.)

This extract illustrates how difficult school can be for a learner with ADHD. A learner who cannot sit still, cannot remember what has just been said, cannot copy from the board and who finds it difficult to make and keep friends, can experience school as a hostile place. Kewley (2005:65) maintains that such a learner's unique abilities may get lost in the struggle. Learners with ADHD experience a wide range of challenges and no two learners are the same; thus there is a wide range of educational needs within the regular classroom (Kewley, 2005:65).

ADHD is one of the most prevalent childhood disorders, occurring in three to five percent of school-aged children (Jakobson, 2007:194). Symptoms of ADHD include (1) high levels of activity (2) impulsivity and (3) inattention (American Psychiatric Association, 1994:82; Caplan & Sadock, 2004:189). These symptoms must persist for a period of at least six months to the extent that it is perceived as maladaptive and inconsistent with the child's developmental level. The DSM-IV-TR (American Psychiatric Association, 1994:82) differentiates between three types of ADHD: (1) the predominantly hyperactive-impulsive type, (2) the predominantly inattentive type, and (3) the combined type where all three symptoms (hyperactivity, impulsivity and inattention) are present. Approximately 85 percent of children with ADHD are diagnosed with the combined type (Armstrong, 1999:75; Jakobson, 2007:194).

Although ADHD is not classified as a learning disability, it affects children's learning abilities (Shimabukuro, Prater, Jenkins & Smith, 1999:398). Learners with ADHD find it difficult to process information and incoming stimuli. Nolen (2004) and Armstrong (1999:36) emphasize the fact that learners with ADHD experience problems in the traditional classroom where they are expected to sit still and be attentive all the time. Learners with ADHD are often perceived as *"problem children"* in a regular classroom situation (Bester, 2006:12). Armstrong (1999:37) states that learners with ADHD are

didactically more demanding and that they require more attention and stimulation from teachers than other learners.

School is a very difficult place for them; they are constantly moaned at or sent out of the class. They lose their sense of self-worth and fall behind in their work because they do not finish their tasks and make careless mistakes. If they cannot concentrate long enough to listen to the teacher, they fail to pay attention to important parts of school work and will not be able to understand those parts. They may even have to repeat grades and about a third of ADHD learners fail to finish their high school careers (Bester, 2006:13).

Bester (2006:24) holds the opinion that there is a growing tendency among teachers to focus mainly on the shortcomings of learners with ADHD and that this negative focus should shift towards their positive abilities and skills. Just because a learner has ADHD, it does not mean that he/she cannot learn and is unable to be successful at school. Learners with ADHD only need more understanding and support from their teachers. Shearer (2004:155) supported this viewpoint and states that an educational vision that is based on a well-being paradigm (focusing on the total child) is needed for the instruction of learners with problems. There is too much emphasis on the limitations of learners with problems (departing from the illness or pathological model) without recognizing their potential and strengths. In this regard Armstrong (2000:64) recommended that when research is conducted on the abilities and potential of children with ADHD, it needs to depart from a positive "well-being" perspective.

Shearer (2006) views Gardner's theory of Multiple Intelligences (MI) (Gardner, 1983) as an example of a positive theoretical perspective from which research on the inner intellectual capacity and potential of learners can depart. Gardner's (2000) MI theory proposed that educators should not only focus on the general or global intellectual abilities of learners, but on learners' individual intellectual strengths as well. The MI theory implies that learners with ADHD possess latent intellectual strengths that need to be identified and utilized (Guignon, 2004). In his book titled *"Frames of mind: the theory of multiple intelligences"*, Gardner (1983) defines the different types of intelligences as follows:

- *Linguistic intelligence* is the ability to read, write and communicate with words.
- *Logical/mathematical* intelligence is the ability to think logically inductively, to recognize patterns and to work with abstract concepts.

- *Visual spatial intelligence* is the ability to visualize objects and spatial dimensions and create internal images and pictures.
- *Bodily/Kinaesthetic intelligence* is the ability to use one's mental abilities to manipulate and coordinate movements of one's body.
- *Musical intelligence* is the ability to recognize, compose and remember tonal changes, rhythms and musical pitch.
- *Interpersonal intelligence* is the ability to recognize and understand others' feelings and interact appropriately with other people.
- *Intrapersonal intelligence* is the ability to perceive one's own feelings and motivations for planning and directing one's life.
- *Naturalist intelligence* is the ability to recognize and classify natural surroundings, such as flora and fauna or rocks and minerals.

Gallagher (2006) and Schirduan and Case (2004:89) found that learners diagnosed with ADHD usually have good visual intelligence, but perform poorly in the linguistic and logical/mathematical intellectual fields. Schirduan et al., (2004:90) mention that teaching in the traditional classroom centres mainly on learners' linguistic and logical/mathematical intelligences and learners with ADHD therefore experience scholastic problems because their stronger intelligences are not being optimally utilized.

Nolen (2003:116) and Leaf (2005:28) hold the opinion that the only way to generate transformation in the teaching of learners with ADHD is by changing the traditional teaching approach to a more learner-centred approach. The MI theory offers a theoretical framework for designing and implementing such a learner-centred approach (Armstrong, 2000:59). In order to accommodate ADHD learners optimally in classrooms, it is necessary for teachers to be knowledgeable about the MI theory and to be informed about the MI profiles of learners with ADHD (Barrington, 2004:421). Bailey (2007) found that teachers' knowledge of the instruction of learners with ADHD is inadequate. Cloete (2005:64) as well as Chanizadeh, Bahredar and Moeini (2006:85) reported that approximately 75% of teachers are not aware of the existence of multiple intelligences and they recommended that teachers should receive extensive training in Gardner's MI theory. Shearer (2004:149) and Brown (2005) stated that teachers are obliged to teach ADHD learners in accordance with their MI profiles. In the same vein,

Stanley (2006:2) concluded that MI profiles are indispensable tools for providing a higher quality of teaching to learners with ADHD.

The Outcomes Based Education (OBE) curriculum, which the South African education system had adopted in 1997, emphasizes equal development and learning opportunities for all learners and stipulates that teachers need to build a bridge between learners' areas of weaknesses and their areas of strength (2002:1). The following statement of Gardner (2000) supports this vision of OBE: *"The most important moment in a child's education is the crystallizing experience: when the child connects to something that engages curiosity and stimulates further exploration".*

Most of the scholastic problems learners with ADHD experience can be attributed to the type of formal education they receive. In conjunction with the aims of the OBE, MI theory provides a theoretical framework for a teaching approach which builds on ADHD learners' strengths and helps them to achieve at their maximum. The implementation of MI theory can assist ADHD learners who do not experience success in school, to enhance their scholastic achievement and their desire to learn (Armstrong, 1994:1). Beckman (2001:4) stated the gains of implementing MI theory as follows: "*The beauty of incorporating Howard Gardner's eight intelligences into the classroom is that it allows for all children to learn through their strengths and to share their expertise".*

When ADHD learners experience success in the classroom they are capable of achieving in accordance with their true potential and this will prepare them for a meaningful and productive adult life (Brown, Ilderon & Taylor, 2001:52).

In the light of the afore-mentioned, this research aimed at addressing the following research questions:

- What do the MI profiles of ADHD learners reveal in terms of their intellectual strengths and weaknesses?
- Do the MI profiles of ADHD and non-ADHD learners differ significantly?
- What are the implications of the ADHD learners' MI profiles for their teaching and learning?

1.3 Aims of research

In accordance with the above-mentioned research questions, the aims of this study were to determine:

- what the MI profiles of ADHD learners reveal in terms of their intellectual strengths and weaknesses;
- whether the MI profiles of ADHD and non-ADHD learners differ significantly; and
- the implications of ADHD learners' MI profiles for their teaching and learning.

1.4 Research design and methodology

The following research design and methodology were implemented to achieve the aims of the research:

1.4.1 Literature study

A computer search for relevant and recent sources relating to MI and Attention Deficit/ Hyperactive Disorder was initiated. Databases such as ERIC, EBSCO host and NEXUS were consulted and Internet-search engines such as Google Scholar and the ISI Web of Knowledge were used to identify relevant literature sources.

The following key words were used in the searches: *Multiple intelligence; Attention Deficit/Hyperactivity Disorder (ADHD); Teaching children with ADHD.*

1.4.2 Empirical investigation

1.4.2.1 Research design

To answer the research questions and achieve the aims of the research, the researcher used a quantitative, non-experimental descriptive design.

1.4.2.2 Participants

All the Section 21 primary schools (ex-model C schools) of the D12 school district (Roodepoort) in the Gauteng Province served as the target population from which two groups of respondents were selected, namely:

- an ADHD-group consisting of all Grade 4-7 learners in the above-mentioned schools who had been diagnosed by professionals (psychologists and medical doctors) with ADHD (the combined type) and placed on medication; and
- a control group consisting of a random sample of Grade 4–7 learners from the above-mentioned schools who did not display any symptoms of ADHD and had never been diagnosed with ADHD.

Armstrong (1999:75) and Bester (2006:18) point out that approximately 85% of learners diagnosed with ADHD present with the symptoms of the combined type (Type 3). For this reason only Type 3 learners participated in this study.

1.4.2.3 Data collection instruments

The MI profiles of the ADHD and non-ADHD participants were determined by means of the *Multiple Intelligences Developmental Assessment Scale for kids* (MIDAS-KIDS). (Consult Appendix 1). The MIDAS was developed by Shearer (1996) as a self-report questionnaire that assesses the eight multiple intelligences (MI) as described by Gardner (1983; 1993). Shearer developed the MIDAS-KIDS questionnaire for children between ages 9 and 14 years.

The MIDAS-KIDS has been favourably evaluated by Gardner, and Buros (1999) supported its use within the educational context. The MIDAS has been subjected to international scrutiny and was found to be a valid and reliable instrument to assess multiple intelligences (Shearer, 2005:150).

Ethical aspects of the research

The prescribed departmental application process was followed to apply for permission to conduct the research in the public schools of the Gauteng Province as mentioned in paragraph 1.4.2.2 above. (Consult Appendix 2.) Once departmental permission had been granted, the principals of the various schools were approached to brief them on the nature of the research and to obtain their permission to conduct the research in their schools. (Consult Appendix 3.). Once the school principals had given their permission, teachers and parents/guardians were informed in writing concerning the nature of the research and their involvement with the research. Parents/guardians gave their informed consent (on behalf of their minor children) to participate in the research.

Participation took place on a voluntary basis and participants could withdraw at any time during the research.

No institution or person was identified by the research and all information was treated with the strictest of confidentiality. No participant was harmed (physically or psychologically) and their well-being was protected at all times. The measuring instrument (MIDAS-KIDS) was administered in accordance with the rules and regulations contained in the manual and the prescriptions of the compiler and publisher.

1.5 Plan of research

The dissertation is divided into the following chapters:

Chapter 1: Introduction, problem statement, aim, method and plan of research.

Chapter 2: The ADHD learner in the classroom.

Chapter 3: Multiple intelligences: A theoretical exposition.

Chapter 4: Method of research

Chapter 5: Results, conclusions and recommendations.

CHAPTER 2
THE ADHD LEARNER IN THE CLASSROOM

2.1 Introduction

Attention–Deficit/Hyperactivity Disorder (hereafter abbreviated as ADHD) is a common psychological disorder characterized by developmentally inappropriate levels of inattention and/or hyperactivity-impulsivity among children (National Institute for Mental Health, 2003; Reiff, 2004:13; Miller, Miller, Trampush, McKay, Newcorn & Halperin, 2006:355; Simon 2006:2).

During the course of their lifetime, children with ADHD are at an increased risk of experiencing functional problems, including school performance difficulties, academic failure, troublesome interpersonal relationships with their families and peers and low self-esteem (Skount, Philalithis, Mpitzaraki, Vamvoukas & Galanakis, 2006:658).

The classroom may be one of the most difficult places for children with ADHD to find themselves in, most probably because this setting requires children to engage in behaviours that are contrary to the core symptoms of the disorder. These children have difficulty remembering and following written and verbal instructions, writing neatly, spelling accurately, completing tasks and controlling their impulses. Most of these children hate school; they spend seven hours a day being reprimanded for their poor scholastic performance and unacceptable behaviour (Abikoff, Jensen, Arnold *et al.*, 2002; Barkley, 1997; Stewart, 2006:10).

DuPaul (2007:218) maintains that although children with ADHD experience significant academic and behavioural difficulties, research suggests that the majority of classroom teachers lack knowledge of what constitutes appropriate interventions and modifications.

2.2 Diagnosis and symptoms of ADHD

In 1993 the World Health Organization published the diagnostic criteria for research on mental and behavioural disorders (including hyperkinetic disorder (HKD) in the tenth edition of the *International Classification of Diseases* (ICD-10; World Health

Organization, 1993). The following year the fourth edition of the *Diagnostic and Statistical Manual for Mental Disorders* (DSM-IV; American Psychiatric Association, 1994) provided revised diagnostic criteria for attention-deficit/ hyperactivity disorder. The DSM-IV diagnostic criteria for ADHD were based on reviews of existing research (Lahey, Pelham, Chronis, Massetti, Kipp, Ehrhardt & Lee, 2006) and a field trial in which alternative diagnostic criteria were evaluated.

2.2.1 ICD-10 and DSM-IV criteria for HKD and ADHD

Although the diagnostic definitions of HKD and ADHD differ largely, the ICD-10 and DSM-IV work groups adopted the same list of symptoms for both disorders, which facilitates comparisons of the two diagnoses (Lahey *et al.* 2006:472). ICD-10 symptom criteria for HKD and DSM-IV criteria for ADHD are presented in Table 2.1 below.

In the fourth edition of the *Diagnostic and Statistical Manual for Mental Disorders* (DSM-IV; American Psychiatric Association, 1994), ADHD is sub-typed into (a) the predominantly hyperactive-impulsive type, (b) the predominantly inattentive type, and (c) the combined type. Most children with ADHD have symptoms of both inattention and hyperactivity; thus of the combined type (American Psychiatric Association, 1994).

Table 2.1: Symptom criteria for ICD-10 Hyperkinetic Disorder (HKD) and DSM-IV Attention-Deficit/ Hyperactivity Disorder (ADHD)

Inattention symptoms	Hyperactivity – impulsivity symptoms
1. Inattentive to details/makes careless mistakes	Fidgets or squirms
2. Difficulty sustaining attention	Leaves seat when should remain seated
3. Seems not to listen	Runs or climbs excessively
4. Does not follow through and complete tasks	Difficulty playing quietly
5 Disorganized	"On the go" or acts as if "driven by motor"
6. Avoids/ dislikes tasks requiring sustained attention	Talks excessively
7. Often loses necessary things	Blurts out answers
8. Distractible	Difficulty waiting in lines/ awaiting turn
9. Forgetful	Interrupts or intrudes on others

To make an ICD-10 Hyperkinetic Disorder diagnosis, the following symptoms and criteria need to be met:

- More than 6 symptoms of inattention and more than 3 symptoms of hyperactivity (1-5) and more than 1 symptom of impulsivity (6-9) must exist;
- Symptom criteria must be met independently of parent informant using DISC and teacher information;
- Functional impairment must be reported in both home and school settings;
- Age of onset must occur before the age of 7 years.

DSM-IV Attention-Deficit/Hyperactivity Disorder symptom criteria that need to be met before a diagnosis of ADHD can be made are as follows:

- 6 or more symptoms of inattention and 6 or more symptoms of hyperactivity-impulsivity must be present that last for at least 6 months to a degree that is maladaptive and inconsistent with developmental level;
- Impairment and each ADHD symptom can be reported by either the parent or the teacher;
- Functional impairment must be reported in both home and school settings;
- Onset of symptoms should start before the age of 7 years.

After decades of differences in the specific symptoms listed, the ICD-10 and DSM-IV manuals now recognize the same 18 symptoms for HKD and ADHD, but decisions still differ regarding cut-off criteria and subtypes (Swanson, Sergeant, Taylor, Sonuga-Barke, Jensen & Cantwell, 1998).

Swanson *et al.* (1998) indicates that the main differences between the DSM-IV and ICD-10 diagnostic criteria are related to the concomitance of the three domains (inattention, hyperactivity and impulsivity), the exclusion of co-morbidity and the degree of pervasiveness. ICD-10 criteria require a full set of symptoms in all three domains, while DSM-IV recognizes three subtypes of the disorder.

Lahey, Pelham, Stein, Loney, Trapani, Nugent, Kipp, Schmidt, Lee, Cale, Gold, Hartung, Willcutt and Baumann (1998) initiated a study on the validity of ADHD in

children first diagnosed. Their finding suggests that ICD-10 diagnostic criteria for HKD are predicatively valid when the diagnosis is given to children. The DSM-IV definition of ADHD appears to be predicatively valid in the sense of exhibiting continuing symptoms and impairment over time at levels that are at least the equivalent of hyperkinetic disorders and occasionally more serious.

Lahey *et al.* (2006:472) found that both ICD-10 HKD and DSM-IV ADHD diagnostic criteria exhibit predictive validity over a period of six years, but the ICD-10 criteria appear to under-identify children with persistent ADHD symptoms and related impairments.

ADHD is quite often considered over-diagnosed. However, less has been written about possible underestimation (Lahey *et al.* 2006:472). Many children with ADHD symptoms may remain without a diagnosis and without the help they truly need. Despite their drawbacks, population-based epidemiological studies of ADHD are accomplishable and useful, as they provide knowledge regarding the understanding of prevalence and risk factors, and potentially allow for an early diagnosis, treatment and good long-term prognosis.

2.2.2 Core symptoms of ADHD

There is a group of core symptoms common to those who have ADHD. These include cognitive difficulties, physical difficulties and emotional difficulties. These symptoms exist over a prolonged period of time and are present from an early age, although they may not be evident until a child is pushed to concentrate or to organize his or her life (Amen, 2001:12; DuPaul & Weyandt, 2006; Reiff, 2004:57;Simon, 2006).

2.2.2.1 Cognitive difficulties

A short attention span is the hallmark symptom of this disorder. Children with ADHD have trouble sustaining attention and effort over prolonged periods of time. Their minds tend to wander and they frequently get distracted, thinking about or doing things other than the task at hand (Amen, 2001:13). DuPaul *et al.* (2007:161) noted that children with ADHD can pay attention perfectly well to things that are new, novel, highly stimulating, interesting or frightening. These things provide enough of their own intrinsic stimulation, which activates the brain functions that help people with ADHD to focus and concentrate.

Children with ADHD have problems paying attention to regular, routine, everyday matters such as schoolwork, chores or paperwork.

Distractibility differs from a short attention span (Reiff, 2004:58). The issue here is not an inability to sustain attention, but rather a hypersensitivity to the environment. Most children can block out unnecessary environmental stimuli: traffic sounds, food smells and birds flying. Children with ADHD, however, are often hypersensitive to their senses, and they have trouble suppressing the sounds and sights of the environment – the sensory information surrounding us. The distractibility is likely due to the underlying mechanism of ADHD, namely an under-activity in the prefrontal cortex of the brain (Amen, 2001:14). The prefrontal cortex has many inhibitory cells that signal other areas of the brain to settle down. It is supposed to send these inhibitory signals to the parietal lobes so that we do not sense too much of the environment. However, when the prefrontal cortex is under active, the parietal lobes bombard us with environmental stimuli. The prefrontal cortex also sends inhibitory signals to the brain's emotional centres in the limbic system. When this does not happen, people get distracted by their internal thoughts and feelings. Many people with ADHD do not like to be touched, or they react negatively if touched the "wrong" way. In a similar way, sight sensitivity is a frequent problem. They seem to have a wide-angle lens; they see everything at once. The problem lies in regulating the attention and zooming in on the most important things (Amen, 2001:12; DuPaul *et al.,* 2006 Reiff, 2004:57;Simon, 2006).

DuPaul (2006) and Reiff (2004:59) state that many children with ADHD complain about being excessively bothered by sounds, especially the chewing sounds of others. Sensitivity to taste is another problem. Children with ADHD will often only eat food with a certain taste or texture.

Organizational problems are very common among children with ADHD, specifically disorganization of space, time, projects and long-term goals. They are often unable to see that objects stand out from the background and have trouble arranging and organizing schoolwork. Their desks, rooms, closets or school bags frequently are a disaster (Amen, 2001:17; Armstrong, 1999:92;Green & Chee, 1997:33).

ADHD children tend to be unpredictable, inconsistent and aimless; they often act without considering the consequences (Green & Chee, 1997:32). Their self-control is not good and it is difficult for them to resist temptations to act improperly. They often make careless errors and engage in acts that disregard their safety and health and

seemingly they cannot identify for obvious risks. As a result of this, they tend to be very accident–prone (Amen, 2001:20; Stewart, 2006:20).

2.2.2.2 Physical difficulties

In general, ADHD children tend to be underweight because they are constantly busy with purposeless activities and jump, fidget, squirm, rock, wiggle, run and talk excessively (Green & Chee, 1997:29; Stewart, 2006:20).

They may suffer from asthma, eczema, hay fever, sinusitis and tonsillitis. They may also be hypersensitive to preservatives, colourants, flavourants and aromatic substances such as gasoline, smoke, perfume and paint. ADHD children may suffer from numerous ear infections and this may affect their hearing that could affect their concentration span as well (Anon., 2005 and Stewart, 2006:20).

Eighty percent of these children are frequently thirsty because they often have an essential fatty acid deficiency. Omega-6 and omega-3 fatty acids are crucial for normal brain structure and function (Richardson, 2003:92). The body needs essential fatty acids to manufacture certain hormone-like substances called Prostaglandins and Leukotrienes, which affect functions and tissues in the body (Anon., 2005; Stewart, 2006:20). Richardson (2003:95) found that children with ADHD often have an omega-3 deficiency.

They may have poor co-ordination and experience problems with their fine or gross motor skills (Green & Chee, 1997:6; Kewley, 2005:35). Due to this, some of them may be clumsy when they walk or experience difficulties when playing sport. Some ADHD children experience problems with tasks that require good eye-hand co-ordination and fine motor skills such as buttoning, tying shoelaces, writing and drawing (Stewart, 2006:20).

2.2.2.3 Emotional difficulties

Children with ADHD often lack the awareness of their social impact on others. They tend to harm others when they do not mean to. They are very quick to blame others for difficulties rather than to accept responsibility (Amen, 2001:35; Simon, 2006:12). They tend to be very excitable, they suffer from mood swings, their demands must be immediately met, they are aggressive and they have a low frustration threshold. They

cry easily, it is "now or never", it is "right or wrong" – there is no middle ground and there is no compromise (Green & Chee, 1997:30; Solanto, 2002; Stewart, 2006:21).

Solanto (2002) as well as Green and Chee (1997) remark that children with ADHD often display compulsive habits and suffer from anxieties, fears and phobias. Children with ADHD tend to be very sensitive and may occasionally suffer from depression. They tend to be emotionally immature and emotionally speaking, they tend to be two to three years less mature than other children (Stewart, 2006:21).

2.3 Coexisting conditions associated with ADHD

One source of confusion regarding ADHD diagnosis and treatment is that ADHD frequently does not occur in isolation, but in co-existence with other disorders. As many as 50-60 percent of all children with ADHD also have at least one coexisting disorder and more than 10 percent have 3 or more (Reiff, 2004:199; Kewley, 2005:25). These disorders complicate the ADHD symptoms and increase the risk of psychiatric, educational and other problems.

Reiff (2004:200) and Kewley (2005:25) state that it is necessary to consider whether a child has any coexisting disorders when they are evaluated for ADHD. These include disruptive behaviour disorders, anxiety disorders, mood disorders, Tics, Tourette syndrome and obsessive–compulsive disorder (OCD), learning, motor skills and communication disorders, mental retardation and pervasive developmental disorders.

2.3.1 Disruptive behaviour disorders

Disruptive behaviour disorders are among the easiest to identify because they are readily observed in the form of temper tantrums, acts of physical aggression such as attacking other children, excessive argumentativeness, stealing and other forms of defiance or resistance to discipline and authority (Biederman, 2007:32; Reiff, 2004:204).

2.3.1.1 Oppositional Defiant Disorder (ODD)

Oppositional defiant disorder (ODD) is defined as persistent symptoms of *"negativistic, defiant, disobedient, and hostile behaviors toward authority figures"* (American Psychiatric Association, 2004). ODD is the most common co-morbid disorder associated with ADHD, occurring in 30-60% of children with ADHD (Biederman, 2007:32).

As many as one-half of all children with ADHD, mostly boys, suffer from ODD (Biederman, 2007; National Institute for Mental Health, 2003).

Children with ODD are often excessively hostile, defiant and may argue frequently with adults; lose temper; refuse to follow rules; blame others for their own mistakes; deliberately annoy others; and otherwise behave in angry, resentful, and vindictive ways (Kewley, 2005:25). They are likely to encounter frequent social conflicts and disciplinary situations at school (Reiff, 2004:204; Kewley, 2005:25; Biederman, 2007). The most common symptom of this disorder is a pattern of negative, defiant and hostile behaviour towards authority figures that lasts longer than 6 months (Biederman, 2007; Reiff, 2004:204).

Kewley (2005:25) states that ODD has a pernicious and devastating effect on interpersonal relationships. Life with these individuals is like walking on eggshells, and symptoms frequently worsen with time in a vicious spiral of academic and relationship failure, with consequent lowering of self-esteem. Taylor (2002) states they seem to calm down later in life and most regret the way they were when they were younger.

2.3.1.2 Conduct Disorder (CD)

Conduct disorder is a more extreme condition than ODD and is defined as *"a repetitive and persistent pattern of behaviour in which basic rights of others or major age appropriate social rules are violated"* (Reiff, 2004:204).

CD may involve serious aggression towards people or the hurting of animals, deliberate destruction of property, stealing, running away from home, skipping school, deceitfulness, lying or otherwise trying to break some of the major rules of society without getting caught (Biederman, 2007; Reiff, 2004:205; Taylor, 2002).

They may be callous and unemotional, display a lack of empathy and have problems in interpersonal relationships. They may have a superficial charm, but with little show of emotion and a lack of conscience. These children tend to be confrontational by bullying, threatening and intimidating others, starting physical fights or using weapons to cause serious harm to others (Biederman, 2007; Kewley, 2005:26).

Reiff (2004:205) and Taylor (2002) maintain that these children are commonly viewed as delinquents, and they are likely to be suspended from school and have more police contact than children with ADHD alone, or ADHD combined with ODD.

These children feel absolutely no remorse and they are described as being malicious, and even sadistic (Reiff, 2004:205). The symptoms are first evident between the ages of seven and ten years. If the child displays no symptoms at the age of 12, it is unlikely to occur (National Institute of Mental Health, 2003; Reiff, 2004:205).

2.3.2 Anxiety disorders

About one fourth of children with ADHD also have an anxiety disorder (Reiff, 2004:208). This includes all types of anxiety disorders – generalized anxiety disorder, obsessive-compulsive disorder, separation anxiety, and phobia.

Anxiety disorders are often more difficult to recognize than disruptive behaviour disorders because the former symptoms are internalized (Reiff, 2004:208). An anxious child may be experiencing guilt, fear or even irritability and yet escape notice by a parent or teacher. They may seem tense, irritable, tired or stressed out. They may not sleep well, and may even experience brief panic attacks – involving pounding heart, difficulty breathing, nausea, shaking and intense fears – that occur for no apparent reason (Barkley, 2006; Reiff, 2004:208).

Young children who have experienced traumatic events, including sexual or physical abuse or neglect, may exhibit characteristics of ADHD, including, impulsivity, emotional outbursts and oppositional behaviour (Reiff, 2004:208; Simon, 2006; Barkley, 2006).

2.3.3 Mood disorders

Mood disorders such as depression and bipolar disorder occur in 15-20 percent of children with ADHD and are often difficult to recognize (Reiff, 2004:212). These children often have difficulty with irritability, moodiness and emotional immaturity and tend to overreact to disappointments or frustration (Reiff, 2004:212).

2.3.3.1 Dysthymic disorder

The National Institute of Mental Health (2003) indicates that this disorder is characterized by chronic low-grade depression, persistent irritability and a state of demoralization, often with low self-esteem.

Reiff (2004:213) states: "*The indicators must occur for a year or longer, although symptoms may have subsided for up to 2 months at a time within that year. Indicators*

are: poor appetite or overeating, insomnia or excessive sleeping, low energy or fatigue, low self-esteem, poor concentration or difficulty making decisions and feelings of hopelessness".

2.3.3.2 Major depressive disorder (MDD)

This is a more extreme form of depression that can occur in children with ADHD and is marked by a nearly constant depressed or irritable mood or a marked loss of interest or pleasure in all or nearly all daily activities (Green & Chee, 1997:50; Reiff, 2004:213). These children experience sleep difficulties and are agitated. In addition to the symptoms of dysthymic disorder, a child with MDD may cry daily, withdraw from others, become extremely self-critical, talk about dying, or even think about, plan or carry out a suicide attempt (Green & Chee, 1997:50). They may experience feelings of worthlessness and difficulty concentrating.

2.3.3.3 Bipolar disorder

Recent research indicates a definite association between ADHD and Bipolar Disorder but this finding is not yet universally accepted (Green & Chee, 1997:51; Stewart, 2006:24).

One study found that as many as 25% of children diagnosed with ADHD may also have bipolar disorder, commonly called manic depression (Green & Chee, 1997:51). Indications of this problem include episodes of depression and mania, with symptoms of irritability, rapid speech, and disconnected thoughts, occasionally occurring simultaneously. Both disorders (ADHD and bipolar disorder) often cause inattention and distractibility and may be difficult to distinguish from each other (Green & Chee, 1997:51). However, children with mania and ADHD may display more aggression, behavioural problems and emotional disorders than those with ADHD alone (Green & Chee, 1997:51; Stewart, 2006:24).

A child with bipolar disorder and ADHD is prone to explosive outbursts, extreme mood swings and severe behavioural problems (Green & Chee, 1997:51). They typically have poor social skills and family relationships are often strained because of the child's extremely unpredictable, aggressive or defiant behaviour (Green & Chee, 1997:51; Miller *et al.*, 2006; Stewart, 2006:24).

2.3.4 Tic disorder and Tourette Syndrome

Tics involve sudden, rapid, repetitive movements or vocal utterances. They may be motor tics such as excessive eye blinking or vocal tics such as chronic repetitive throat clearing noises. In children who develop tic disorders and ADHD, the ADHD usually develops 2-3 years before the tics and it normally starts during the period when medication is given to ADHD children (Kewley, 2005:28; Taylor, 2002). This has resulted in the assumption that the medication caused the tics. The tics can be made worse by stress and anxiety, and may fluctuate with the situation, coming and going for months at a time. Some children "release" the tics once they come home from school, having been able to contain them during the school day (Kewley, 2005:28).

In rare instances, if both vocal and motor tics are frequent, persistent and significant, a diagnosis of coexisting Tourette Syndrome (TS) should be considered (National Institute of Mental Health, 2003). TS is characterized by a variety of motor tics ranging from recurrent eye, face and shoulder movements, simple vocal tics like sniffing, coughing, grunting, hissing, barking, yelping, humming and spitting and more complex vocal tics such as swearing, repeating their own or other people's words. More complex motor tics may also exist such as grooming of hair or other parts of the body, touching objects or body parts, pinching or picking skin, retracing footsteps, turning round in circles doing deep knee bends, hopping, jumping, skipping or rude finger and hand gestures (Kewley, 2005:30).

Tourette syndrome, which is quite rare, is a disinhibition disorder, occasionally best known for the associated swearing, although this occurs in only 10-30 percent of TS children (Green & Chee, 1997:50; Reiff, 2004:217; National Institute of Mental Health, 2003).

2.3.5 Obsessive Compulsive Disorder (OCD)

Green and Chee (1997:51) believe there is a negligible association between ADHD and the obsessive, almost ritualistic behaviours of OCD. OCD involves symptoms such as obsessive thoughts (e.g. a highly exaggerated fear of germs) and compulsive behaviours (e.g. excessive hand-washing rituals in an attempt to reduce the fear of germs) that the child is unable to control or limit (Green & Chee, 1997:51).

Green and Chee (1997:51) accentuate that children with excessive obsessive symptoms may demand to have their bedrooms organized in a fastidious way or that items around the house are positioned in specific places and they may display obsessional eating habits, such as a need for specific cutlery and crockery.

Breaking the obsessions or compulsions, especially in pre-school children, may cause significant defiance, tantrums and behavioural upsets which can be mistaken for Oppositional Defiant Disorder (Reiff, 2004:218). In this sense, OCD is similar to tic disorders and TS, and it creates additional functioning problems for children with ADHD (Green & Chee, 1997:51; Reiff, 2004:218; Taylor, 2002).

2.3.6 Sleep difficulties

Many children with ADHD find it difficult to sleep, which can aggravate an already difficult situation, making the child tired and less able to concentrate during the day (Kewley, 2005:28).

Children with sleep difficulties may be very active all night and keep moving in their sleep, they can be fitful and restless; may be unable to sleep because of anxiety, noises, darkness and other disturbing conditions; be unable to get to sleep because their brains are over-active so that they cannot relax (Kewley, 2005:28).

2.3.7 Eating disorders

Cortese, Bernardina and Mouren (2007:407) noted that clinicians have generally overlooked the co-morbidity of ADHD and binge eating. However, emerging data from empirically based studies suggest that the rate of binge eating behaviours in children with ADHD is higher than expected (Cortese *et al.*, 2007:407).

Both the impulsive and the inattentive component of ADHD may foster problematic eating patterns, including binge eating behaviours (Cortese *et al.*, 2007:407). As for impulsivity, Cortese *et al.* (2007:407) suggests that deficient inhibitory control as well as delay aversion, which are both expressions of the impulsivity component of ADHD, may contribute to abnormal eating behaviours, including binge eating.

2.3.8 Learning Disorders

Most learning problems encountered by children with ADHD are not associated with bona fide learning disabilities (Reiff, 2004:218). Kewley (2005:28) states that about 40 percent of children with ADHD experience learning challenges such as work production problems and organizing difficulties that are categorized as learning "problems"; not disabilities.

Kewley (2005:29) states that there has been a tendency to use the word "dyslexia" as an all-embracing term for children with specific learning difficulties. Dyslexia can cause concentration difficulties in the educational setting, and when a child with dyslexia also has poor concentration due to ADHD, it is important to recognize this and not doubly disadvantage the child.

A variety of studies indicate that between 9 and 45 percent of ADHD learners of school-going age have a coexisting reading disorder (Kewley, 2005:29). Most reading disorders involve difficulties with recognizing single words, rather than with reading comprehension and these learners tend to reverse letters, inverse letter order in words, confuse and transpose relatively common words, produce dysgraphic misspellings and make visual substitutions in oral reading. Many ADHD learners do not actually have reading disorders, but due to their inattentiveness, the comprehension of the material is significantly impaired. They scan rapidly, missing key passages in the interest of completion. Others read so slowly that they forget the start of the paragraph or the sentence (Amen, 2001:45; Copeland & Love, 1995:24; Green & Chee, 1997:46; Stewart, 2006:41; Taylor, 2002).

Reiff (2004:222) states that mathematics disorders can be thought of as "a type of learning disability in which spoken language is not affected, but computational arithmetic is". Relatively a number of ADHD learners have great difficulty in computational accuracy and organization. Learners with coexisting ADHD, or even ADHD alone, can experience problems in mathematics such as the making of careless mathematical errors, rushing through problems and impulsively putting down the wrong answers. They struggle tremendously with the areas of the mechanics of mathematics (dyscalculia). They do not manage to learn the computational tables. Many young ADHD learners prefer using their fingers to calculate addition and subtraction problems,

and when the numbers get too high, they battle (Amen, 2001:45; Copeland & Love, 1995:22; Stewart, 2006:40; Taylor, 2000).

ADHD learners with written expression disorder can experience difficulty with the composition of sentences and paragraphs, using correct grammar, punctuation and spelling in their written work (Amen, 2001:45). Their handwriting can be sloppy and occasionally unreadable. They often use a mixed cursive-print form; the stroking of the letters is completed as quickly as possible, and letters tend to be misformed (Amen, 2001:45; Copeland & Love, 1995:22).

2.3.8.1 Motor skills Disorder

Motor skills disorder, also known as "developmental coordination disorder", (Reiff, 2004:224) is diagnosed when motor skill problems significantly interfere with academic achievement or activities of daily living. Reiff (2004:224) noted that these learners seem to be clumsy and awkward and are rarely picked for teams at school.

Children with ADHD frequently display symptoms of motor skill disorder but it is frequently overlooked due to its nonspecific cluster of symptoms (Green & Chee, 1997:51). When co-morbid clumsiness co-exists with ADHD, some therapists may only observe the motor problems, calling this *"the clumsy child syndrome"* (Green & Chee, 1997:51; Reiff, 2004:224).

Children with co-ordination difficulties may experience problems with handwriting, bike riding and ball catching, generally tripping over things and being awkward. The apparent clumsiness can be due to impulsive movements or lack of concentration (Green & Chee, 1997:51).

2.3.9 Speech and language difficulties

Significant speech and language problems, especially stuttering, can have a major impact on a child's self-esteem and socializing ability. There has been a tendency to assume that all concentration problems in learners with speech and language difficulties are due to their frustration and struggle with speech problems (Copeland & Love, 1995:21).

Learners with speech and language difficulties have delays in normal speech development; lack of speech clarity; problems in sequencing, problems in verbal

expression; stuttering, hesitations and stammering and, difficulty with finishing sentences (Amen, 2001:52; Copeland & Love, 1995:2).

Deficits in language skills mostly involve the use of language to accomplish social actions. For example, some children with ADHD lack the ability to use self-talk, which is critical for being able to mediate their behaviour and follow prescribed rules; the topic of conversation is frequently switched, and their responses are not related to questions asked (Jakobson, 2007:195).

Learners with ADHD who suffer from speech and language difficulties have language problems and may suffer from spelling disorders (Copeland & Love, 1995:21; Green & Chee, 1997:46; Amen, 2001:52). These learners work rapidly and impulsively and do not edit their work. They can remember spelling words only for brief periods (Amen, 2001:52; Copeland & Love, 1995:21; Green & Chee, 1997:46;).

2.4 Diagnostic Agents

No laboratory test – no urine, blood, x-ray or psychological analysis – can prove objectively whether ADHD is present (Reiff, 2004:19). Deciding whether a child's behaviour signals the presence of ADHD is therefore a complex process that involves comparing a child's behaviours and abilities to function with those of other children his age. To do this, paediatricians and mental health professionals must rely on teachers' and parents' observations of how the child is functioning (Kewley, 2005:36; Reiff, 2004:19).

2.4.1 Teachers as diagnostic agents

There can be little doubt that teachers play a very important role in the identification of ADHD in the classroom. Furthermore, a recent study concluded that a diagnosis of ADHD may be missed altogether if information is not sought from teachers concerning learners' functioning in school (Lauth, Heuback, Mackowiak, 2006:386).

School teachers play an important role in ADHD diagnosis since the symptoms of ADHD are often exhibited almost entirely in classroom settings (Lauth *et al.,* 2006:386). Teachers observe many learners on an everyday basis and may be better informed to point out a behavioural problem than parents. However, a particular learner's behaviour may be more conspicuous in a more homogeneous classroom where a small deviation

from a norm may seem problematic. On the other hand, in heterogeneous classrooms with learners from many different backgrounds, diverse behaviours may be acceptable and a similar behaviour of a learner may be acceptable considering the prevailing behavioural norm in the classroom. Thus diversity may explain some of the variance in ADHD symptoms that can be observed across geographic areas and the learner's peers and classroom composition may play an important role in the diagnosis of ADHD (Scheinder, 2007:10; Skounti *et al.*, 2007:121).

The Conners Teacher Rating Scale is one of the most widely used scales in assessing stimulant drug effects in hyperactive children (Herdon, 2006:21). There is the original version introduced in 1969, and an abridged version, but the original version has been more extensively used.

The test is completed by the teacher. Items are divided into three groups – (1) classroom behaviour, (2) group participation, and (3) attitude towards authority. Each item is rated on a four-part scale of "not al all", "just a little bit", "pretty much" and "very much" with scores of 0, 1, 2, and 3 for the respective responses. The age range is 6-17 years. Completion requires approximately 5-10 minutes (Herdon, 2006:21).

2.4.2 Parents as diagnostic agents

The practitioner will conduct a family interview to enable the specialist to compile a well–documented history of the learner's symptoms. Most clinicians will send a history form to the family several weeks prior to the interview appointment to enable the family to focus on the key issues. The assessment questionnaire forms the basis of the interview and looks at the key problems worrying the parents, parents' ideas of the possible causes of the problems, what attempts have been made to resolve them in the past, and what help has been sought.

The Conners Parent Rating Scale is used by parents for the assessment of childhood behavioural disturbances in psychopharmacologic studies (Herdon, 2006:20). The test is completed by the parent or the caretaker of the child for the symptoms that are currently evident (previous symptom - i.e. not present during the past month – are not to be rated).

Areas assessed by the questionnaire include problems regarding hyperactivity, inattention, aggression, anxiety, somatic complains, fears, obsessive–compulsive behaviour, and school adjustment problems (Herdon, 2006:21).

Herdon (2006:21) points out that each item is to be rated by the parent on a four–point scale of "not at all", just a little", "pretty much" or "very much" with scores of 0, 1, 2 and 3 for these respective responses. Summary scores and factor scores can be obtained. The age range is 4-16 years and completion requires approximately 10-15 minutes (Herdon, 2006:21).

2.4.3 Medical and psychological professionals as diagnostic agents

Kewley (2005:38) maintains that a child should have a general and neurological examination. Pulse rate and blood pressure, height and weight should be measured and recorded. An assessment should be made of whether there is evidence of an underlying syndrome or any unusual birthmarks that occasionally indicate neurological difficulties such as neurofibromatosis. Co-ordination, vision and hearing should also be checked (Kewley, 2005:38).

2.5 Aetiology of attention deficit hyperactivity disorder

2.5.1 Biological causes

2.5.1.1 Genetic factors

During the past decade scientists have made progress in understanding the genetics of ADHD. The pioneering works of David Comings, Florence Levy and others have clearly demonstrated a genetic component to this disorder (Comings, 2006; Simon, 2006:4). Specific gene sites associated with ADHD include the HLA on chromosome 6, the dopamine transporter gene on chromosome 11 (Simon, 2006:4). Child psychiatrist Florence Levy from Australia found that 81 percent of identical twins (who share identical genetic material) had Attention Deficit Disorder (ADD), while fraternal twins (who have sibling genetic material) share ADD only 29 percent of the time (Comings, 2006; Simon, 2006:4).

It is thus safe to conclude that a very high percentage of ADHD is passed down genetically. If one parent has ADHD, then 60 percent of the offspring will have it as well. If both parents have ADHD then 85 percent to 90 percent of the children will have it (Comings, 2006; Simon, 2006:4).

Research done on the genetic bases of ADHD shows that children with ADHD often have a close relative with a similar problem. Identical twins share almost the same risk; if one twin suffers from ADHD, there is almost a 90 percent chance that the other one will also have this problem. Even among non-identical twins, the risk factor is quite high. If one twin has ADHD, the other one stands a 30 to 40 percent chance of also having ADHD (Barlow & Durand, 2002:458; Copeland & Love, 1995:17; Green & Chee, 1997:17, National Institute of Mental Health, 2003; Simon, 2006:4; Stewart, 2006; Tailor, 2002).

2.5.1.2 Neurological factors:

- **Brain structure**

  Advanced brain imaging techniques have indicated differences in the size of certain parts of the brain between children with ADHD and children who do not have ADHD. The areas showing differences in size include the prefrontal cortex, caudate nucleus, the globus pallidus and the cerebellum (Barlow & Durand, 2002:458; Green & Chee, 1997:17; Reiff, 2004:15; Stewart, 2006).

  The prefrontal cortex is located in the front of the brain. It is thought to be the brain's command centre. It regulates the brain's ability to block certain responses. Numerous imaging studies have indicated that the prefrontal cortex of the brain in people with ADHD may be less active than in those without the disorder (Barlow & Durand, 2002:458; Green & Chee, 1997:17; Stewart, 2006). The caudate nucleus and globus pallidus, located near the centre of the brain, speed up or stop orders coming from the prefrontal cortex. A major 2002 study reported that the globus pallidus was smaller than the average in young children with ADHD, but tended to normalize as children grew older (Barlow & Durand, 2002:458; Stewart, 2006).

  Abnormalities in these areas may impair a person's ability to stop certain actions, resulting in the impulsivity typical of children with ADHD.

The cerebellum is the area above the brain stem. This area helps to control muscle tone and balance and synchronizes muscle activity. Studies reported that this area tends to be smaller in children with ADHD compared to those without the condition (Barlow & Durand, 2002:458; Copeland & Love, 1995:17; Green & Chee, 1997:17; National Institute of Mental Health, 2003; Simon, 2006:4 Stewart, 2006; Tailor, 2002).

- **Brain chemicals**

Abnormal activity of certain chemicals in the prefrontal cortex may contribute to ADHD. The chemicals dopamine and norepinephrine are of special interest. Dopamine and norepinephrine are neurotransmitters or chemical messengers that affect both mental and emotional functioning (Barlow & Durand, 2002:458; Simon, 2006:4; Stewart, 2006).

- **Head injury**

One of the most common causes of ADHD is unrecognized head injury, especially to the left front side of the brain (Amen, 2001:23). According to Amen (2001:23) too many parents and professionals discount or ignore the impact of head injuries (Amen, 2001:23).

- **Toxic exposure**

When children are exposed to a lack of oxygen or some toxic substances, it is much more likely that they will display symptoms of ADD (Amen, 2001:23). Oxygen deprivation can occur among premature babies who have under-developed lungs, babies born with the umbilical cord wrapped tightly around their necks, and children surviving drowning incidents (Amen, 2001:23). Lack of oxygen causes a decrease in overall brain activity (Amen, 2001:23). Brain infections, such as meningitis or encephalitis, cause toxic inflammation in the brain and damage brain tissue. Fetal exposure to drugs, alcohol and cigarettes can also put the unborn child at risk of developing ADHD and learning disabilities (Amen, 2001:24; Armstrong, 1999:16). Often mothers who use addictive substances during their pregnancies are medicating their own problems with depression, ADHD or anxiety and their babies are more likely to inherit pre-dispositions to

these problems and/or brain damage due to their exposure to these toxic substances (Amen, 2001:24; Armstrong, 1999:16).

2.5.1.3 Medical problems and medications

Certain medical problems, such as thyroid complications, can present with ADHD-like symptoms, e.g. hyper-/hypo activity and inattentiveness. Certain medications, such as asthma medications, can induce hyperactivity and inattentiveness as well (Amen, 2001:24; Armstrong, 1999:16).

2.5.2 Environmental and developmental factors

Barlow and Durand (2001:1194) believe that there is some evidence that September is the peak month for births of ADHD children. The reason for this may be that pregnant mothers and their unborn foetuses are exposed to winter infections during the first trimester of pregnancy in the northern hemisphere.

The human brain normally undergoes major growth spurts at several developmental stages, namely ages 3 -10 months, 2-4 years, 6-8 years, 10-12 years and 14-16 years. As stated by Barlow and Durand (2001:1194), some children experience a maturational delay in the developmental sequence and may manifest symptoms of ADHD that appear to normalize by about age five.

Researchers have reported evidence of higher incidences of ADHD among very low birth weight populations compared to normal birth weight samples (Lahti, Raikkonen, Kajantie, Heinonen, Pesonen, Jakobson & Kikas, 2007:196).

2.5.3 Psycho-educational factors

2.5.3.1 Early childhood neglect and abuse

Both physical and emotional neglect and abuse can contribute to ADHD or ADHD-like symptoms in children. The brain needs nurturance and appropriate stimulation to develop properly. When a baby is physically and emotionally neglected or abused, the brain cannot develop properly and the child is put at a great risk of developing learning and behavioural problems. An extreme example of physical and psycho-educational neglect occurred during the late 1980s when thousands of Romanian orphans were

raised without affection, touch or nurturing, even though they were given enough food (Amen, 2001:35; Kewley, 2005:24). Many of these children developed severe emotional, learning and behavioural problems. Brain scans showed overall decreased activity in their brains as well. It seems that the brain does not make the necessary neurological connections when deprived of appropriate emotional and physical stimulation. Emotional and/or physical abuse causes a rush of stress hormones and chemicals that poison a baby's or child's brain (Kewley, 2005:24; Stewart, 2006). Stress hormones damage memory centres, and chronic stress causes the brain to become hyper alert, leading to severe distractibility and an inability to filter out extraneous stimuli (Amen, 2001:35; Kewley, 2005:24; Stewart, 2006).

2.5.3.2 Negative self-esteem

Due to their low self-esteem, self-doubt and a lack of confidence some children may display ADHD-like symptoms in their behaviour. On the other hand, having ADHD can also induce a low self-esteem in children. A negative self-esteem often stems from the negative feedback ADHD children receive from the important people in their lives, i.e. their parents, teachers and peers.

2.5.3.3 Learned helplessness

Psychologist Martin Seligman coined the term "learned helplessness" to describe what he saw in depressed patients (Amen, 2001:34). This phenomenon often occurs in children with ADHD. Learned helplessness develops when a person tries to do something at the best of his/her ability, such as achieving academically or behaving properly, but still performs poorly. They try again, but it does not work. Finally they give up. This demoralization often contributes heavily to ADHD symptoms and need to be assessed (Amen, 2001:34).

2.5.4 Social and societal factors

The potential fallout from undiagnosed and miss-managed ADHD learners taken into consideration, society may expect a lot more societal problems to occur in the future. Thirty years ago teachers would typically have one or two classic cases of ADHD learners in their classrooms. Now they report that they have three to five learners per class. Comings (2006) postulates that as our society becomes more technologically

advanced, learners are required to stay in schools longer to compete for the best jobs. Learners who drop out of the educational system and become societal burdens are often those with ADHD and learning disabilities (Amen, 2001:34).

2.6 The prevalence of ADHD

The prevalence of ADHD among learners is not precisely acknowledged. Various sources estimate that between 2 and 20 percent of learners display the symptoms within a six-month period before the age of 7 (Barkley, 1995; Barlow & Durand, 2002:458; Copeland & Love, 1995:6; Green & Chee, 1997:2; National Institute of Mental Health, 2003; Skounti *et al.*, 2007:117).

DuPaul *et al.* (2007:183) and the National Institute of Mental Health (2003) break the prevalence down even further and state that 4 percent of the population suffer from the hyperactive-impulsive type of the disorder, of which 80 percent are males. It is assumed that the incidence of ADHD is the same in most countries, also with regard to the different race groups (Green & Chee, 1997:4). In contrast, Schneider (2007:9) states that individual communities and population subgroups vary widely as far as ADHD prevalence is concerned.

The prevalence of ADHD has been reported with great variations among different studies ranging from 2.2 to 17.8 percent (Schneider, 2007:9). Population variables that definitely affect the prevalence rates include gender, age, population sample, socio-economic status, diagnostic measures and informants (Schneider, 2007:9).

Boys seem to outnumber girls and are referred for help six times more than girls are (Skounti *et al.,* 2007:177). Both community and clinical samples clearly suggested a higher ADHD prevalence in boys (DuPaul *et al.,* 2007:183; Skounti, *et al.,* 2007:177). It is suggested that the true ADHD gender ratio is three boys to one girl, but many girls remain undiagnosed because they are less disruptive than boys (DuPaul *et al.*, 2007:183). Girls may not display bad behaviour but they could be failing at school due to attention deficit problems (Barlow & Durand, 2002:458; Caplan & Sadock, 1998:1193; Copeland & Love, 1995:4; DuPaul, 2007:183; Reiff, 2004:13).

The influence of age on the prevalence of ADHD was strongly supported by the findings of several studies. DuPaul *et al.* (2007:183) and Schneider (2007:10) point out that a clear decline in ADHD symptoms is observed as learners grow older.

Higher prevalence rates have been associated with lower socio-economic status and among learners coming from an urban locality compared to learners living in rural geographic locations (Schneider, 2007:10), but no significant differences were observed regarding the geographic place of residence in other studies.

The prevalence of ADHD seems to vary, depending on who reported on the symptoms. Schneider (2007:10) demonstrated prevalence rates of 3.3%, 5.0% and 8.9% when learners, parents or teachers respectively reported on the symptoms.

As is true for most developmental disorders, there is no definite test for ADHD, and both diagnosis and classification rely on description. This lack of definite diagnostic tools has contributed to great variations in the prevalence of ADHD (Schneider, 2007:10; Skounti *et al.*, 2007:117).

Modifications in the definition and diagnosis of the disorder as it appeared in the different editions of the Diagnostic and Statistical Manual (DSM) of Psychiatric Disorders seemed to influence the prevalence rates of ADHD as well (Skounti *et al.*, 2007:120). Skounti *et al.* (2007:120) explain that the ADHD prevalence rate was higher applying DSM-IV criteria in the diagnosis than was the case implementing the DSM-III-R diagnostic criteria, probably due to the recognition of the disorder subtypes in the DSM-IV. This tendency is strongly supported by two studies which applied both DSM-III-R and DSM-IV criteria to the same population and demonstrated great differences in prevalence rates, 7.3 percent versus 11.4 percent and 10.9 percent versus 17.8 percent, respectively (Skounti *et al.,* 2007:120).

The application of DSM-IV criteria and emphasis on the subtypes of ADHD seem to have led to an increase in the prevalence of the disorder. Contrary to earlier DSM editions, the DSM-IV diagnostic criteria require evidence of symptoms in two settings (e.g., school and home) and the use of multiple diagnostic agents/informants has become a basic diagnostic practice. Thus the application of DSM-IV criteria to screen children in different settings may narrow the extent of differences in prevalence estimations (American Psychiatric Association. 1994; National Institute of Mental Health, 2003; Schneider, 2007:11; Skounti *et al.*, 2007:121).

Another important issue regarding diagnostic methods used in studies world-wide is the difference between the DSM-IV and ICD-10 diagnostic criteria (Skounti *et al.*, 2007:121). After 20–30 years of different operational definitions, the DSM-IV and ICD-

10 present an almost identical symptomatology of the disorder in their recent versions. However, they still use different names for the disorder, which are ADHD according to DSM-IV and hyperkinetic disorder (HKD) according to ICD-10, and there are major differences in the diagnosis of the disorder, potentially leading to considerable prevalence discrepancies (American Psychiatric Association. 1994; National Institute of Mental Health, 2003; Schneider, 2007:11; Skounti *et al.*, 2007:121).

ADHD prevalence may be culturally dependent, because what is considered abnormal in one culture may be more acceptable in another, and culture may affect the report by informants such as parents, teachers or clinicians (Schneider, 2007:11; Skounti *et al.*, 2007:121).

As indicated above, the prevalence of ADHD is influenced by a range of factors. Skounti *et al.* (2007:122) motivate that it is important to be aware of these factors when children are diagnosed.

2.7 The impact of ADHD on the child

Research has consistently shown that children with ADHD tend to experience a huge amount of difficulty with interactions and consist of poor social skills (Barkley, 2006; DuPaul *et al.*, 2006:216). Kewley (2005:32) mentions that, children with ADHD want friends but struggle with the social dialogue. They know what to say, but are unable to put it into the right words; it is a performance problem rather than a total lack of skill.

2.7.1 Social impact of ADHD

2.7.1.1 Impact on relationships with peers

There are a number of possible reasons why children with ADHD experience relationship problems with peers. One reason could be that they tend to engage in behaviours considered to be controlling, trouble-making and aggressive (Amen, 2001:45; DuPaul *et al.*, 2007:185). These behaviours are likely to be perceived by peers as negative and thus prompt rejection by the peers, especially during play activities (Amen, 2001:45; DuPaul, 2007:185; Kewley, 2006:32; Miller *et al.*, 2006).

Children with ADHD are likely to interrupt others during conversations, often do not listen closely to what others are saying, and occasionally respond in an abrupt,

al., 2007:185). This tendency is perhaps the most damaging to relationships with peers

impulsive manner, thereby disrupting conversations to a significant degree (DuPaul *et al.*, 2007:185). This tendency is perhaps the most damaging to relationships with peers and other people. Children with ADHD often impulsively blurt out whatever comes to their minds and as a result of this, they get stuck in arguments defending their impulsive statements, causing further problems.

ADHD children tend to talk for self-stimulation and there seems to be an internal drive/need to do so continuously. This habit may irritate others who feel that they do not get a chance to utter a word during the conversation. This tendency of ADHD children to dominate conversations is perhaps the most damaging to their relationships with others (Amen, 2001:45; DuPaul *et al.,* 2007:185).

Due to their distractibility, conversations between ADHD children and others are often cut short or left incomplete, leaving the other person feeling unimportant or rejected. ADHD children often miss large chunks of information during conversations and they may unconsciously fill in the missing pieces with negative or distorted information.

Even though the child with ADHD may want to finish what he or she has started, distractibility gets in the way, and many things may be left half done. This inability to complete tasks leads to much resentment and frustration and many arguments with others (Amen, 2001:45; DuPaul, 2007:185).

Children with ADHD are often teased by their peers because their behaviour draws negative attention to themselves. Additionally, their impulsivity and conflict-driven nature cause them to tease others, occasionally to the point where the other person becomes very upset (Kewley, 2005:32). Amen (2001:45) maintains that children with the inattentive subtype of ADHD are more likely to be picked on. Consequently they spend time alone.

Fighting is typical for many children with ADHD. It may be related to impulsivity (saying or doing things without thinking), stimulation-seeking behaviour, misperceptions, rage outbursts and a chronically low self-esteem. The fighting leads to chronic stress for the child with ADHD and those in his or her family (Amen, 2001:45; Kewley, 2005:32).

Often the level of activity or noise created by the children with ADHD causes frustration and irritability in others (DuPaul, 2007:185). At the same time the ADHD children may also be sensitive to noise. They often need to escape from others to feel calm or

peaceful inside (Kewley, 2005:32) and this isolation can also harm their relationships with peers.

Children with ADHD tend to take part or initiate high-risk activities and this type of behaviour often is a matter of great concern to the parents of the ADHD child. Their peers and friends often feel pressurized or coerced to participate in this dangerous behaviour, causing rifts in their friendships.

Children with ADHD generally see things as either "black" or "white" and have great difficulty in seeing and acknowledging another person's point of few (DuPaul, 2007:185). Their inflexibility or stubbornness may make rational and reasonable arguments with their peers very difficult as they appear to be unable to compromise. ADHD children may instigate an argument from a second or third stage in a sequence of events, failing to acknowledge the original problem because they have forgotten it due to their poor short-term memory (Kewley, 2005:33).

Many children with ADHD often have trouble thinking of anyone but themselves (DuPaul, 2007:185). Blind to the emotional needs of others, they are often labelled as spoiled, immature or self-centred (Kewley, 2005:33). Boys with ADHD often find it difficult to empathize with people in difficult circumstances. One speculative explanation of this lack of empathy could be that it is a self-protective reaction to suppress the negative feelings children with ADHD are likely to experience most of the time (Kewley, 2005:32).

Emotional, physical, neurological and social immaturity is typical of the ADHD child (Copeland & Love, 1995:33; Green & Chee, 1997:5). They are late bloomers and may reach various levels of maturity six months to several years later than their peers. Due to their immaturity, ADHD children usually have few friends of their own age group and play with much younger children (Copeland & Love, 1995:33; Green & Chee, 1997:5;, Stewart, 2006:36).

Children with ADHD often do not cope well in group situations and function better in one-on-one relationships. Green and Chee (1997:5) and Copeland and Love, (1995:33) indicate that children with ADHD usually have relatively good superficial social skills, but get bored with long-term friendships and experience difficulties in establishing and maintaining deep and intimate relationships.

Children with ADHD are more likely to behave in a verbally or physically aggressive manner than their non-ADHD peers, presumably because of their low impulse control (Barkley, 2006). Furthermore, children report not wanting to befriend peers with ADHD, particularly those who experience difficulties with over-activity (Barkley, 2006). Given their social inadequacies, several studies have indicated that children with ADHD are not well liked; more often rejected and have fewer friends than their non-ADHD peers (DuPaul, 2007:185).

ADHD children are not purposefully nasty, they often have a low self-esteem and report feelings of loneliness and sadness about not being liked by their peers, and they desperately want to fit in (Amen, 2001:45; Copeland & Love, 1995:33; DuPaul, 2007:185; Green & Chee, 1997:5; Kewley, 2005:32; Miller *et al.*, 2006; Stewart, 2006:36).

2.7.1.2 Impact on family members

Amen (2001:194) found that ADHD often causes serious problems in families. For many parents living with an ADHD child is like being in a war zone. They have to be constantly on guard that the child will not run out into the street, break something at the store, or run off at a park. This chronic watchfulness causes much internal tension for parents.

Children with ADHD are often experts at getting their parents to yell at them. Amen (2001:194) mentions that the ADHD child has decreased activity in their frontal lobes. They "unconsciously" seek stimulation to feel more awake or alert. In a family, this takes on many forms, such as temper tantrums, noise and high levels of activity.

There is increasing recognition of the financial impact of ADHD on the family (Amen, 2001:35). Parents need to finance interventions for educational, psychological and medical resources, which have obvious consequences on the family. Trying to balance the demands of a child with ADHD and the demands of their own work has also been identified as a major stressor for parents (Amen, 2001:35; Kewley, 2005:27).

The time and attention needed to deal with a child with ADHD can change internal family relationships and have devastating effects on parents and siblings. Marriages are often stressed to the breaking point because of exhaustion and disagreements between the husband and wife on how to raise the child (Amen, 2001:35).

Studies indicate that any intervention for the ADHD child must include the parents as well (Amen, 2001:35; Kewley, 2005:27). Parents who are responsive to their child in a positive way can help to reduce the incidence of oppositional behaviours. But it can be very difficult. A child with ADHD can be wonderful one day and terrible the next, for no apparent reason. The parents can feel betrayed and hurt, and believe they have no control over their child. Mothers generally bear the brunt of the emotional and physical abuse a child with ADHD can produce, which is sadly ironic because the child tends to love the mother intensely and feel safe with her (Amen, 2001:36). Parents of ADHD children often face the hostility and anger of other parents and see their own children being rejected. It is very easy to fall into an emotional black hole, and feel alone, inadequate and helpless.

A non-ADHD sibling who is not given parental attention in his or her own right may begin to imitate the undesirable behaviours of their ADHD brother or sister and begin to act out their frustrations in negative ways. It is very important to make the siblings feel equally important in the family circle. However, non-ADHD siblings should feel that their value in the family lies in being the caregivers of their ADHD sibling(s).

Siblings of children with ADHD have particular difficulties and are also at risk of psychological impairment, depression and language disorders. The non-ADHD sibling often feels alienated and alone, because the focus of the parents falls on their ADHD brother or sister most of the time. Non-ADHD siblings are often victimized by the ADHD brother or sister who may be very demanding or guilty of bullying (Amen, 2001:35; Kewley, 2005:27).

Children with ADHD often irritate their siblings to the point of causing tears, anger or fights. Kewley (2005:28) states that non-ADHD siblings frequently complain about their school assignments being damaged or destroyed by the ADHD sibling and they develop negative feelings towards the ADHD brother or sister because they are often embarrassed by the child's outrageous behaviour at school or with friends (Amen, 2001:35). Since ADHD, for the most part, is a genetic disorder, it is more than likely that some of the siblings may also display features of ADHD (Amen, 2001:35; Kewley, 2005:27). Having two or more children in a family with untreated ADHD can completely disorganize the family.

2.7.2 Educational impact

2.7.2.1 *Impact on teachers*

Given the nature and frequency of the negative behaviours exhibited by learners with ADHD, it is not surprising that teachers often feel pessimistic about teaching children with the condition (Kewley, 2005:29; Ozdemir, 2006:693).

Teachers tend to perceive children with ADHD as requiring extra teaching time and effort (Ozdemir, 2006:693), a perception that seems to be a reflection of reality. The symptoms exhibited by children with ADHD make teaching in traditional classroom settings very challenging. Research indicates that teachers display more negative behaviours (e.g. being more intense and controlling) than positive behaviours when interacting with children with ADHD (Ozdemir, 2006:696).

Although some teachers might become pessimistic when dealing with ADHD learners, they generally perceive themselves as being competent enough to handle them in the classroom (Ozdemir, 2006:693). Teachers have been shown to modify their teaching as a result of having learners with ADHD in their class, particularly by providing greater structure and routine and by preparing work in greater detail (Ozdemir, 2006:696).

While teachers are concerned about the social difficulties experienced by learners with ADHD, they tend to be more concerned about their problematic behaviour involving control, discipline, achievement, and listening to and complying with instructions (Kewley, 2005:29; Ozdemir, 2006:693).

2.7.2.2 Scholastic impact

ADHD has a powerful negative impact on learners' ability to do well in school. Except for classes that are small and where highly individualized didactic approaches are followed, many learners with ADHD experience significant scholastic problems in general/ordinary classroom situations (Barkley, 2006). Although most children with ADHD are placed in general education classrooms, they are at higher than average risk of being identified for special education services (Barkley, 2006; Department of Education, 2002).

- **Impact on learning and scholastic performance**

  During the early grades, ADHD and learning problems often go un-noticed because the learner is able to utilize compensatory skills. The learner is able to memorize the work and only when faced with unfamiliar work, will it for example be picked up that the child cannot read (Barkley, 2006). Stewart (2006:35) and Copeland (2002) noted that although it is difficult to identify the learning problems, there are some clues that may help with the early identification of learning problems, i.e. they may not be able to colour within the lines, they may be day-dreamers, they may have problems processing and remembering directions or instructions.

  Having a short attention span and being easily distracted affects nearly every aspect of the ADHD learners' learning and scholastic performance (Barkley, 2006). It will affect ADHD learners' ability to follow the teacher's instructions, their participation in small groups, and performance in formal assessments. Their short attention span often causes ADHD learners' attention to wander while reading or writing, causing them to take an inordinate amount of time to finish tasks. They tend to forget their books, leave clothes at school, and not to turn in homework assignments on time (Barkley, 2006; Copeland, 2002).

- **Impact on behaviour and discipline**

  ADHD learners' behaviour can range from under-active to overactive and hyperactive. Unfortunately, the under-active learners are often not recognized and are therefore less likely to receive help. They appear to be depressed, confused and not paying attention. They are often viewed as being disinterested or as having a bad attitude. They daydream, fail to complete tasks, have poor leader-ship ability and have immense difficulty in learning and performing (Copeland & Love, 1995:5; Green & Chee, 1997:43).

  Amen (2001:198) mentions that hyperactivity that often accompanies ADHD causes obvious problems. The learner is restless, out of his or her seat, irritating other learners and causing turmoil and disruption in his or her path. The restless-ness of ADHD learners usually distracts others in class who notice the constant movements like leg shaking and the constant shifting of body posture in their

seats. The longer they have to sit still at school, the worse their behaviour becomes. Noise or movement distracts the ADHD learner and they settle down in class with great difficulty (Amen, 2001:198; Barlow & Durand, 2002:457; Copeland & Love, 1995:5).

Barlow and Durand (2002:457) indicate that ADHD learners' impulsiveness causes serious behavioural problems as well. Blurting out answers in class and responding impulsively to quizzes or tests are typical examples of behaviour that cause disciplinary problems in the classroom. These learners often wait until the last minute to complete their tasks and their procrastination results in hastily done, untidy and incomplete scholastic tasks.

ADHD learners also have poor impulse control, which leaves the learner both physically and verbally accident-prone. They trip, fall and act stupid (Copeland & Love, 1995:21; Stewart, 2006:38). Due to their poor coordination skills, (fine-motor, namely colouring, handwriting, tying shoelaces, or gross-motor, namely running, climbing, catching a ball, riding a bike, etc) they have difficulty in planning what they want to do and with the quality of their flow of movement. Their clumsiness often leads to accidents and injuries in the classroom or on the play-grounds.

It is evident that learners with ADHD display behaviours in class that clearly distinguish them from their peers. However, there may be gender differences regarding the severity of these problems. For example, Abikoff *et al.* (2002) reported that while boys with ADHD show significant behavioural problems in the classroom, girls with the disorder are more likely to have predominantly inattentive symptoms and are slightly more disruptive than typically developing learners.

Chang and Shih (2007:148) state that over one-fourth of teachers indicate that ADHD learners appear to be less disciplined than their peers in the general population. Learners with ADHD frequently push behavioural boundaries to the limit. They tend to confront authority figures, partly because of their impulsiveness and partly because of not concentrating on what they are told to do.

School bullies often victimize ADHD learners because they are inclined to overreact to taunting, and often they are blamed for the fight that ensued (Rabiner, Coie, Miller-Johnson, Boykin & Lockman, 2005:134). ADHD learners do not start

the day looking for trouble, but they seem to attract it to them. They are aware of what is right and wrong, but often do not realize it until it is too late. For example, if a non-ADHD learner is pushed in the line, he/she will normally first check if the teacher is watching and then retaliate, but the ADHD learner will respond immediately and get caught. The ADHD learner is then wrongly labelled as being aggressive (Green & Chee, 1997:5, Stewart, 2006:36). Research findings indicate that learners with ADHD are at a high risk of disciplinary measures and interventions. The high incidence of behavioural problems among learners with ADHD may contribute to this high-risk level (Rabiner *et al.*, 2005:134).

- **Impact on self-esteem**

DuPaul (2007:185) states that failure in relationships often leads to a low self-esteem. Self-esteem can be defined as feeling and believing in your own competence and worth. A positive self-esteem enables you to tackle challenges, learn from successes and failures and treat yourself and others with respect. Poor self-esteem results in an inaccurate assessment of your own abilities and a lack of confidence (Barkley, 2006; Kewley, 2005:32).

Findings suggest that learners with ADHD symptoms asses their self-esteem as very good (Edbom, Lichtenstein, Granlund & Larsson, 2006:654). In contrast, Barkley (2006) reports that parents of children with ADHD noted that their child with ADHD had a lower self-esteem or more emotional and behavioural problems than their non-ADHD siblings or friends.

Edbom *et al.* (2006:654) describe this as a positive illusory bias or as self-protective in order to cope with daily life experience or their failure in school. High self-esteem is seen as an important factor for coping strategies (Edbom *et al.*, 2006:654).

ADHD learners in general display a poor self-esteem, they are exceptionally sensitive, they experience so much failure in relationships and in their efforts, get into so much trouble, put so much effort into their schoolwork, yet achieve so little (Barkley, 2006; Kewley, 2005:32). Learners with ADHD have a poor self-esteem due to common factors causing difficulties in their academic domains mediating other adverse outcomes such as depression. Edbom *et al.* (2006:654) note that depression is commonly diagnosed in learners with ADHD.

Edbom *et al.* (2006:655) suggest that the association between ADHD symptoms and low self-esteem should be important for teachers to know about for their pedagogical work with learners with ADHD symptoms.

2.8 Profile of the ADHD learner in the classroom

Schools and classrooms are primary settings for the identification of ADHD learners because (1) they place special demands on learners in terms of their attention, learning and self-control, and (2) the ready availability of the other learners to make developmental comparisons (Lauth *et al.*, 2006:386). The direct observation of learners in their actual classrooms provides a very important window to researchers who wish to understand the extent and the ramifications of the disorder better.

DuPaul *et al.* (2007) and Barkley (2006) found that learners with ADHD often experience a myriad of difficulties at school related to the core symptoms of the disorder, namely inattention, impulsivity and hyperactivity. They exhibit significantly lower rates of on-task behaviour and were reported by their teachers to display more conduct problems, disruptive behaviour and weaker social skills than their control counterparts. A learner with ADHD may exhibit various behavioural problems in the classroom that can be related to their ADHD symptom profile.

- **Inattentiveness, distractibility and task completion problems**

  ADHD learners are usually distracted and inattentive in an over-stimulating environment such as a big classroom. They are sensitive to sights, sounds, smells and even other learners' movements. In a busy classroom this learner experiences sensory overload, which distracts him/her and causes inattentiveness (Greenspan, 2006).

  Learners with ADHD usually find it difficult to concentrate long enough to complete set tasks, and their academic performance may further be impaired by an inherent tendency to be disorganized as well. A learner with predominantly inattentive symptoms may experience difficulty following teacher instructions and rules, staying on task and completing set work. They usually misplace books, stationery, and other materials needed to complete school work (DuPaul *et al.*, 2006; Simon, 2006).

They cannot stay focused on a single task; they shift from one activity to the other (Barkley, 2006). Teachers are often confused; ADHD learners can do so much when they are stood over and so little when left alone. Their behaviour seems to differ from one day to the next. They appear to concentrate well in one-on-one testing situations but seem to fall apart in group/class assessments. Some ADHD learners tend to drift off into space as their teacher starts to talk – they become the quiet underachievers.

They are also inattentive when a teaching/learning situation is low-key or dull. Some experts (Simon, 2006) believe that certain parts of the brain of ADHD learners may be under-active, so that they are not easily aroused by non-stimulating activities. In contrast, they may exhibit a kind of "super concentration" when exposed to highly stimulating activities such as a video game. Such learners may even become over-attentive, and get so absorbed in a project that they cannot modify or change the direction of their attention.

ADHD learners find it almost impossible to keep working at an uninteresting task. They become bored, but a video game could hold their attention for hours. In general, children with ADHD are often attracted to activities that do not tax the working memory, for example television, computer games or active individual sports. If they are interested in something, they will stick to it (Amen, 2001; Barkley, 2006; Green & Chee, 1997:42; Taylor, 2002;).

Rates of on-task behaviour are particularly low when passive classroom activities such as listening to the teacher's instructions and silent reading are required.

- **Impulsivity**

A learner experiencing impulsivity may call out in class or talk to other students at inappropriate times without considering the consequences of their actions (Barkley, 2006; Diller, 1999; DuPaul *et al.*, 2006). Younger learners may make erratic and aggressive gestures, such as hair pulling, pinching and hitting. Temper tantrums are usually exaggerated and not necessarily linked to a specific event or situation. One of the most painful events a teacher may experience is an abrupt and aggressive attack that may occur after comforting a young ADHD learner. Occasionally their reactions seem to be caused not by anger, but by the learner's apparent inability to endure over-stimulation or displays of physical affection.

- **Over/hyperactivity and disruptive behaviour**

  An overactive learner may cause disruptions such as not staying seated at the desk, playing with objects not related to the set task (e.g. playing with a pencil when instructed to read silently), rocking in chairs, and repetitively tapping their hands or feet (Barkley, 2006; DuPaul *et al.*, 2006). In a busy environment such as a classroom, ADHD learners can become distracted and react by pulling items off the desk, hitting other children, or spinning out of control into erratic, silly or strange behaviour. They tend to leave their assigned desks, bothering other learners and in doing so, interrupting the teacher's instruction.

  Compared to non-ADHD learners, learners with ADHD engage more in off-task behaviour such as day-dreaming and in other activities that are not required for purposes of the lesson (Barkley, 2006; DuPaul *et al.,* 2006). For example, they talk to other pupils and are guilty of disruptive behaviour such as interrupting others, pulling faces and distracting others. They often engage in excessive motor activities such as fidgeting or leaving their desks, and display apparently self-stimulating behaviours like pulling an ear, singing to themselves or rocking to and fro. They are often guilty of negative social behaviour such as aggression to classmates and negative social responses, as well as inappropriate attention-seeking behaviour such as calling out to the teacher (Lauth *et al.,* 2006:387).

- **Scholastic/learning problems**

  In addition to, or possibly as a result of, ADHD, learners with ADHD frequently experience scholastic problems, are retained in a grade, or are suspended or expelled from school (DuPaul & Stoner, 2003). Approximately 20-30 percent of learners with ADHD also experience specific learning problems reading, doing mathematics or writing. As a result of this, these learners are at higher risk of grade retention, placement in special education classrooms, or dropping out of high school (Barkley, 2006). On average, learners with ADHD scored between 10 and 30 points lower than non-ADHD control group children on norm-referenced, standardized achievement tests. Fewer learners with ADHD proceed to post-secondary education levels relative to their similar achieving non-ADHD class-mates (Barkley, 2006; DuPaul *et al.,* 2006).

ADHD learners tend to make silly errors and when reading aloud to the class, they blurt out a word without checking to see if it matches the meaning of the sentence, and they are unable to maintain effort (Barkley, 2006; Green & Chee, 1997:42; Taylor, 2002).

- **Memory problems**

DuPaul and Stoner (2003) believe that an essential feature of ADHD, as well as learning disabilities, can be impaired working (also called short-term) memory that impairs ADHD learners' ability to interpret and process stressful stimuli (Holmberg & Hjern, 2006:668). Learners with ADHD cannot hold groups of sentences and images in their mind long enough to extract organized thoughts. They are not necessarily inattentive. Instead, a learner with ADHD may be unable to remember a full explanation, such as a homework assignment or unable to complete processes that require remembering sequences such as building something (Barkley, 2006; Jakobson & Kikas, 2007:195).

Learners who experience problems with short-term memory struggle to remember instructions, forget large chunks of what is being taught and find it difficult when information is given in a sequence. The inattentive learners that experience problems with auditory memory frequently fail to process oral directions and instructions and therefore receive negative feedback in the classroom, as they do not perform in accordance with the teacher's instructions. An active working memory refers to the learner's ability to hold bits of information in their minds so that they can process it, but if they cannot keep groups of figures in their heads, they find it difficult to do mental arithmetic. They need to remember what they have read at the beginning of the paragraph or else the sentence will not make sense. Occasionally they are able to store information in their memory for short periods of time, so if they study at night, it is all forgotten by the time they write a test or examination (Barkley, 2006; DuPaul, 2007:195; Green & Chee, 1997:5; Jakobson & Kikas, 2007:195; Stewart, 2006:42).

Research has indicated that learners with ADHD display no significant differences in long-term memory compared to non-ADHD learners (Barkley, 2006).

- **Inability to cope with change**

  Jakobson and Kikas (2007:195) found that ADHD learners often have a very difficult time adapting to even minor changes in routines such as getting up in the morning, going to a new teacher or classroom. Any shift in their routine can precipitate a strong and noisy negative response. Even when they are in a good mood, they may suddenly shift into a tantrum if they are confronted with an unexpected change or frustration. Timed test situations often spell disaster for learners with ADHD. Whether it is short math exercises, classroom writing tasks, or testing situations, the time pressure these situations generate can paralyze these learners (DuPaul, 2007:195).

- **Time management and organizational problems**

  Studies suggest that learners with ADHD experience difficulties being on time and planning the correct amount of time to complete tasks. However, DuPaul (2007:195) and Barkley (2006) noted that learners with ADHD tend to believe they use their time wisely, in contrast to reports from their teachers.

  They tend to live for the moment. The deferment of tasks or rewards, or thinking about the future and past, does not come easily. Their inability to plan for the future, to think about the next hour or the next day, and to reflect on the past affects many aspects of their lives, especially planning and organization. However, if they have obsessional tendencies, it may help to counteract their time management problems.

- **Psycho-somatic ailments**

  Holmberg and Hjern (2006:664) emphasize that it is very important for teachers to be aware of the common psycho-somatic complaints of learners with ADHD. Learners with ADHD often complain about psycho-somatic ailments such as headaches, recurrent abdominal pains and back pain, as well as symptoms of a more psychological nature – irritability, nervousness and daytime fatigue. Recurrent pain appears to have negative effects on the scholastic achievement of ADHD learners who also experience associated learning problems and is

frequently the cause of absence from school (Vile Junod, DuPaul, Jitendra, Volpe & Cleary, 2006:85).

2.9 Conclusion

In this chapter, a theoretical exposition of ADHD was undertaken. The variations in prevalence of ADHD were discussed and the differences in the diagnoses and symptoms of this disorder and some of its co-morbid features were focused on. Attention was also given to the aetiology and impact of ADHD on the child. The profile of the ADHD learner in the general classroom was also described.

From this chapter it becomes clear that learners with ADHD experience a myriad of difficulties, particularly with regard to their academic performance and social skills. However, if only the problems and challenges ADHD learners experience are emphasised, teachers may fall into the trap of becoming pessimistic about teaching these children.

Fortunately the problems and challenges ADHD learners experience can often be reduced when teachers implement novel and interesting teaching and classroom management strategies. ADHD learners do not necessarily need more than other learners; they just need more monitoring and structuring. There is nothing wrong with their minds; it is just that their hyperactivity and inattention makes learning difficult. If teachers follow positive teaching approaches, these learners can become the children they want to be.

In the next chapter, the theory of multiple intelligences will be explored with specific reference to Howard Gardner's eight different kinds of intelligences and its application possibilities for teaching ADHD learners.

CHAPTER 3

MULTIPLE INTELLIGENCES: A THEORETICAL EXPOSITION

3.1 Introduction

The ideas inherent in multiple intelligences (MI) were first proposed in the early 1980s with the publication of Howard Gardner's first book, *Frames of mind* (Gardner, 1983). The central proposition of MI is quite simple: "*There are not just two ways to be intelligent, but many ways.*" (Barrington, 2004:422.) This proposition challenges the practice of measuring intellectual ability by means of traditional intelligence (IQ) tests which express a person's "intelligence" in terms of verbal and non-verbal IQ scores.

Gardner's theory of multiple intelligences (MI) has instigated various education reform initiatives that support inclusive teaching philosophies, techniques and assessment strategies found to be effective for learners with and without barriers to learning (Armstrong, 2000:21; Campbell, 1992:199; Stanford, 2003). MI theory accepts and respects human differences and supports and elevates the notion of human dignity and uniqueness.

Gardner initially proposed seven distinct types of intelligences and later added an eighth one in his theory of multiple intelligences (Campbell, 1992:199). These intelligences are verbal/linguistic, logical/mathematical, bodily/kinaesthetic, musical, visual/spatial, naturalist, interpersonal and intrapersonal. Gardner (1995) believes that traditional curricula and instructional strategies only utilize two of the eight intelligences, namely verbal/linguistic and logical/mathematical intelligence and that some learners are educationally advantaged or disadvantaged because of this (Campbell, 1992:199). MI theory thus challenges traditional views and theories on intelligence, learning, teaching, curricula and assessment.

3.2 The idea of multiple intelligence

Gardner (1983:3) expresses his concerns about IQ measurement as follows: "*A young girl spends an hour with an examiner. She is asked a number of questions that probe her store of information, her vocabulary, arithmetic skills, her ability to remember a*

series of numbers, her capacity to grasp the similarity between two elements. She may also be asked to carry out certain other tasks – for example, solving a maze or arranging a group of pictures in such a way that they relate a complete story. Some time afterward, the examiner scores the responses and comes up with a single number – the girl's intelligence quotient or IQ. This number is likely to exert appreciable effect upon her future, influencing the way in which her teachers think of her and determining her eligibility for certain privileges ..."

The importance attached to the IQ-score is entirely inappropriate: after all, the score on an intelligence test does not predict one's ability to do well in school subjects, and it foretells little of success in later life (Gardner, 1983). Gardner (1983:4) states that many academics are not happy with the ways intelligence is determined and believe that there must be much more to intelligence than short answers to short questions.

According to Gardner (1983), the problematic issue of intelligence testing lies less in the technology of testing than in traditional thinking about the intellect and ingrained views regarding intelligence. Gardner holds the opinion that if these views on the human intellect can be changed, it will be possible to assess it more appropriately and to educate it more effectively. Gardner (1983:5) maintains that the notion of multiple intelligences is hardly a proven scientific fact: it is, at most, an idea that has recently regained the right to be discussed seriously.

3.3 A theoretical exposition of multiple intelligence

Many academics ask why Howard Gardner insists on calling the eight categories of his theory, intelligences in stead of talents or aptitudes, but Gardner was quite conscious of his use of the word *"intelligence"* to describe each intellectual category (Armstrong, 2000:3).

3.3.1 Evidence of the existence of multiple intelligences

To provide a theoretical foundation for his claims, Gardner referred to certain bodies of evidence as proof that certain intelligences do exist and that they cannot be equated with talents or aptitudes (Armstrong, 2000:3). These bodies of evidence are described as follows:

- **Potential isolation by brain damage**

  Gardner worked with individuals at the Boston Veterans Administration who had suffered accidents or illnesses that affected specific areas of the brain. In several cases, brain lesions seemed to have selectively impaired one intelligence while leaving all the other intelligences intact (Gardner, 1983:63). For example, a person with a lesion in Broca's area (Left frontal lobe) might have a substantial portion of his linguistic intelligence damaged, and thus experience great difficulty speaking, reading and writing (Armstrong, 2000:3; Gardner, 1983:63). Yet the same individual might still be able to sing, do mathematics, dance, reflect on feelings, and relate to others. A lesion in the temporal lobe of the right hemisphere may impair a person's musical intelligence, while a frontal lobe lesion may primarily affect the personal intelligences. On the basis of these observations, Gardner argued for the existence of eight autonomous brain systems – a more sophisticated and updated version of the "right-brain/left-brain" model of brain functioning that was popular in the 1970s (Armstrong, 2000:3; Gardner, 1983:63;).

- **The existence of savants, prodigies and other exceptional individuals**

  Gardner (1983:63) observed that, in some individuals, single intelligences operate at high levels, "much like huge mountains rising up against the backdrop of a flat horizon" (Armstrong, 2000:3). Savants are individuals who demonstrate superior abilities in one intelligence while their other intelligences function at very low levels (Gardner, 1983:63). This seems to apply to each of the eight intelligences. For instance, there are certain savants who draw exceptionally well, savants who have amazing musical memories (e.g. playing a composition after hearing it only once), savants who read complex material fluently, but do not comprehend what they're reading (hyperlixics), and savants who have exceptional sensitivity to nature or animals (Armstrong, 2000:3; Gardner, 1983:64;).

- **A distinctive developmental history and a definable set of expert "end-state" performances**

  According to Gardner (1983:64), intelligences are developed by participation in some kind of culturally valued activity, and intellectual growth in such an activity follows a developmental pattern. Each intelligence-based activity has its own time

of arising in early childhood, its own time of peaking during one's lifetime, and its own pattern of either rapidly or gradually declining as one grows older (Armstrong, 2000:3; Gardner, 1983:64).

- **An evolutionary history and evolutionary plausibility**

All species display areas of intelligence (and ignorance), and human beings are no exception (Gardner, 1983:65). According to Armstrong (2000:3), Gardner concludes that each of the eight intelligences meets the test of having its roots deeply imbedded in the evolution of human beings and, even earlier, in the evolution of other species. For example, spatial intelligence can be studied in the cave drawings of Lascaux, as well as in the way certain insects orient themselves in space while tracking flowers. Similarly, musical intelligence can be traced back to archaeological evidence of early musical instruments, as well as through the wide variety of bird songs (Armstrong, 2000:3; Gardner, 1983:65).

Armstrong (2000:7) states that the MI theory also has a historical background. Certain intelligences seem to have been more significant in earlier times than they are today. Naturalist and bodily-kinaesthetic intelligences, for example, were probably valued over a hundred years ago when the majority of the population lived in rural settings and the ability to hunt, harvest and provide enjoyed strong social approval. Similarly, certain intelligences become more important as time goes by and new technologies emerge. For example, nowadays the majority of people receive their information through electronic media; therefore the value placed on having a well-developed spatial intelligence may increase (Armstrong, 2000:7).

- **Evidence from experimental psychology**

Experimental psychology has illuminated the existence and operation of individual intelligences (Gardner, 1983:65). For example, applying the methods of the cognitive psychology, details of linguistic or spatial processing can be studied with exemplary specificity. In this regard the identification of different types of memory, attention or perception that may be peculiar to one kind of sensory input can be mentioned (Gardner, 1983:65). Results from psychological experiments and tests provide convincing support for the claim that particular intellectual abilities are

manifestations of particular intelligences. Experimental psychology also helps to demonstrate the ways in which modular or domain-specific intellectual abilities interact in the execution of complex intellectual tasks (Armstrong, 2000:7; Gardner, 1983:65).

- **Evidence from psychometric tests**

  Standardized tests of intellectual ability usually provide the "evidence" most theories of intelligence use to ascertain the validity of the theory (Gardner, 1983:66; Armstrong, 2000:7). Armstrong (2000:7) states that although Gardner is no champion of standardized tests and has been an enthusiastic supporter of alternatives to formal testing, Gardner suggests that the contents of many standardized intelligence tests support the theory of multiple intelligences. For example, the Wechsler Intelligence Scale for Children includes sub-tests that require linguistic intelligence (e.g. information, vocabulary), logical/mathematical intelligence (arithmetic), spatial intelligence (picture arrangement), and to a lesser extent bodily-kinaesthetic intelligence (object assembly) (Armstrong, 2000:7; Gardner, 1983:66).

- **Susceptibility to encoding in a symbol system**

  Gardner (1983:67) maintains that one of the best indicators of intelligent behaviour is the capacity of human beings to use symbols. Gardner (1983:66) suggests that the ability to symbolize is one of the most important factors separating humans from most other species (Armstrong, 2000:8). Much of human representation and communication of knowledge takes place via symbol systems which are culturally contrived systems of meaning which capture important forms of information (Gardner, 1983:66). Language, picturing and mathematics are three of the universal symbol systems essential for human survival and human productivity (Gardner, 1983:66).

  Gardner noted that each of the eight intelligences in his theory meets the criterion of being able to be symbolized. Each intelligence has its own unique symbol or notational system (Gardner, 1983:66; Armstrong, 2000:8). For example, in the case of linguistic intelligence, there is a multitude of spoken and written languages,

and spatial intelligence has its own range of graphic symbols used by architects, engineers and graphic designers.

3.3.2 Prerequisites of an intelligence

Gardner (1983:60) states that two questions should be asked when the "existence" of an intelligence is considered. First, what are the prerequisites for an intelligence (what are the general fundamentals to which a set of intellectual skills ought to conform before that set is worth consideration in the master list of intellectual competences. Second, what are the actual criteria by which it can be judged whether a candidate competence ought to be invited to join the circle of intelligences (Gardner, 1983:60).

According to Gardner (1983:60), human intellectual competence implies that the person must possess a set of problem-solving skills enabling the individual to (1) solve genuine problems or difficulties he or she encounters; (2) create/develop an effective product; and (3) anticipate and avoid potential problems.

Gardner (1983:62) states that a prerequisite for a theory of multiple intelligences is that it captures a reasonably complete range of abilities valued by diverse human cultures. For instance, the intellectual abilities used by a scientist, a religious leader or a politician would be valued by most cultures (Gardner, 1983:60).

"There is a need for a better classification of human intellectual competences than we have now, because there is much recent evidence emerging from scientific research, cross-cultural observations, and educational study which stands in need of review and organization, and perhaps above all, because it seems within our grasp to come up with a list of intellectual strengths which will prove useful for a wide range of researchers and practitioners and will enable them to communicate more effectively about this curiously seductive entity called the intellect" (Gardner, 1983:60).

3.3.3 Definition of intelligence

Gardner identified at least seven intelligences and said that even though these intelligences are independent of each other, they seldom operate independently (Gardner, 1993). In this regard Gardner argues that "*the intelligences are used concurrently and typically complement each other as individuals develop skills or solve problems*" (Brualdi, 1996). Furthermore, Gardner (1983:68) understands an "intelli-

gence" to be a group of abilities that are somewhat autonomous from other human capacities.

Gardner does not view intelligence as a monolithic "capacity," "thing" or "gift", but according to him, "intelligence" includes (1) a set of dispositions and are thus multiple rather than unified; (2) has a core set of information–processing operations; (3) has a distinct history in the stages of development individuals pass through and (4) has plausible roots in evolutionary history (Gardner, 1983).

Gardner (1999) holds the opinion that new ways of thinking or defining multiple intelligences are emerging. In *Intelligence Reframed: Multiple Intelligences for the 21st Century*, Gardner himself has expanded his definition and reformulated his 1983 definition of multiple intelligences. According to this reformulation, Gardner sees intelligence as "*a biopsychological potential to process information in a cultural setting to solve problems or create products that are of value in a culture*" (Gardner, 1999). Thus, in a nutshell, intelligence is the ability to find and solve problems and create products of value in one's own culture.

3.4 The theory of multiple intelligence

In the following paragraphs the different intelligences taken up in the multiple intelligence theory are discussed.

3.4.1 Linguistic intelligence

Linguistic intelligence is likely to be the most thoroughly studied human intellectual ability (Gardner, Kornhaber & Wake, 1996:205). Evidence of this type of intelligence can be found in developmental psychology, which reveals a universal, rapidly developing capacity for language and speech among normal individuals (Gardner *et al.*, 1996:205).

According to Gardner (2001), linguistic intelligence is the ability to use language effectively. This includes written and spoken language. Individuals with good linguistic intelligence are sensitive to the meaning of words and they can effectively manipulate language and communicate with words.

Armstrong (1998:2) states that the linguistic intelligence involves the use of language and words, whether in written or spoken form. It is "*the ability to read, write and communicate with words*" and "sensitivity to the meaning and order of words" (Armstrong,

1998:2). Linguistic intelligence involves having a mastery of language and the ability to effectively manipulate language to express oneself rhetorically or poetically (Brualdi, 1996). Linguistic intelligence allows one to use language as a means to remember information. Linguistic intelligence refers to the individual's potential to use language for purposes of reading, writing, story telling, memorizing dates, and thinking in words (Nelson, 1998) as well as the person's sensitivity to the meaning and order of words (Hoerr, 2004:42).

According to Nolen (2004:115), linguistic intelligence involves the mastery of language. Linguistic intelligence enables one to pay special attention to grammar and vocabulary. Learners with high linguistic intelligence tend to think in words and have highly developed auditory skills. They have a great ability to use words with clarity and they can use this to their own benefit either to explain, persuade or entertain. Language enables them to be better at memorizing information and they are often great storytellers. They are frequently reading or writing and their ability to manipulate language lends them to occupational fields such as teaching, journalism, writing, law and translation work. They tend to be great at explaining, hence the large number of people with high linguistic intelligence that are teachers (Nolen, 2004:115).

Linguistic intelligence is exemplified by poets, who are keenly attuned to the sound and rich meanings of the language they use. It is also a crucial asset for journalists, advertising copywriters and lawyers (Gardner *et al.*, 1996:205).

3.4.2 Musical intelligence

Musical intelligence enables people to create, communicate and understand meanings made out of sound (Gardner *et al.*, 1996:205). Unlike linguistic intelligence, which develops to a rather high degree without formal instruction across different cultures, high-level musical intelligence may require more intensive exposure to music (Gardner *et al.*, 1996:207). In the West, few people achieve great musicality without years of training. Studies of musical prodigies and savants indicate this intelligence is autonomous from other capabilities: it may be manifested at a high level in someone whose other abilities are average or even severely impaired (Gardner *et al.*, 1996:207). Neuropsychological and other brain studies show that areas of the brain dedicated to processing music are distinct from those dedicated to processing language. Core music information processing components include pitch, thyme and timbre (sound quality)

(Gardner *et al.*, 1996:207). Musical intelligence includes the ability to recognize and compose musical pitches, tones, rhythms, melody and sounds, to sing well and understand and appreciate music (Armstrong, 1998). Musical intelligence refers to the potential for thinking in music, for hearing, recognizing, and remembering patterns, as used in singing, identifying sounds, and in remembering melodies and rhythms (Nelson, 1998). Hoerr (2004:42) notes that musical intelligence is the sensitivity to pitch, melody, rhythm and order.

Those with high musical intelligence have a firm understanding of pitch, rhythm and timbre. Through music they are able to convey their emotions. Often this intelligence is discovered at an early age. The individual differences between those with high musical intelligence and those without it are apparent from the day a child learns to sing. These learners are usually able to read music, critique performances and use musical-critical categories (Nolen, 2004:116). According to Gardner (1983:111), music can act as a way of capturing feelings, of knowing and understanding feelings, which is an important part of educating children.

To develop this intelligence, a "music-smart" learner must have a musical ear (for auditory functions), but it is not necessary for the knowledge of rhythm (Brualdi, 1996). This kind of learner likes singing and playing instruments and generally responds to music. Statements made by these learners include; "*I like singing to the radio, I am a member of the choir, I can play one or more musical instruments*" (Brualdi, 1996). "*Play with music*" is another way of describing musical learners. They are found hammering tunes, singing songs and always listening to music. These students always excel at remembering melody, noticing the rhythms of life and keeping perfect time (Nelson, 1998).

Musical intelligence is clearly exhibited in composers, conductors and instrumentalists, as well as acousticians and audio engineers (Gardner *et al.*, 1996:207; Gardner, 2001).

3.4.3 Logical/mathematical intelligence

Logical/mathematical intelligence involves using and appreciating abstract concepts and relationships. Its development has been best documented by Piaget (Gardner *et al.*, 1996:207). In Piaget's work, abstract reasoning begins with exploring and ordering objects. It progresses to manipulating objects and appreciating actions that can be performed with objects, and then to making propositions about real or possible actions

and their inter-relationships (Gardner *et al.*, 1996:207). It advances to the approval of relationships in the absence of action or objects – pure, abstract thought (Gardner *et al.*, 1996:207).

Logical/mathematical intelligence consists of the ability to detect patterns, reason deductively and think logically (Gardner, 1983:130). Children first explore this intelligence by ordering and re-ordering objects. They begin mathematics using material objects such as marbles. In the course of time children are able to do mathematics in their heads without the use of manipulatives. As this intelligence grows, the love of abstraction separates those with mathematical intelligence from the rest. They are able to follow long chains of reasoning very skilfully (Nolen, 2004:116).

Similarly, other elementary forms of logical/mathematical intelligence are manifested at first through observation and manipulation of physical objects (Gardner, 1983:131). In short, according to this analysis, the basis of all logical/mathematical forms of intelligence initially develops from the handling of objects (Gardner, 1983:131).

One core ability of mathematical intelligence is numbering – the capacity to assign a numeral corresponding to an object in a series of objects (Gardner, 1983:131). Mathematical intelligence uses numbers, sequencing and patterns to solve problems. Thus, it "*deals with the ability to think logically and systematically inductively, and to some degree deductively; categorically, to recognize patterns, both geometric and numerical; as well as the ability to see and work with abstract concepts*" (Berman, 1995). Children with this intelligence have an "*aptitude for numbers, reasoning and problem solving*" (Armstrong, 1998:2). It is most often associated with scientific and mathematical thinking (Brualdi, 1996).

According to Nelson (1998), logical/mathematical intelligence is the potential for understanding cause and effect and for manipulating numbers, quantities and operations, as used in mathematics, reasoning, logic, problem solving and recognizing patterns. It refers to the ability to handle chains of reasoning and to recognize patterns and order (Hoerr, 2004:42). It includes reasoning scientifically, analyzing problems logically, carrying out complex mathematical operations, and investigating natural and artificial phenomena (Gardner, 2001).

Learners with this type of intelligence may make statements such as "*solving number problems is easy for me, manipulating numbers fascinates me, I can understand and*

interpret graphs easily" (Nelson, 1998). These learners like to figure things out by constantly asking questions, exploring and experimenting and they easily grasp games that involve sophisticated strategies like chess. McKenzie (2006) also noted that these children may be fascinated by computers or by puzzles that involve logic and reasonable abilities. These are usually the learners who do well in the traditional classroom because they are able to follow the logical sequencing behind the teaching and they are therefore able to conform to the role of model learner. Another advantage is that they are able to calculate very quickly. These characteristics often show up early in life.

Evidence of the relative autonomy of logical/mathematical intelligence comes from its appearance in isolation in some savants, who can perform mathematical feats in the absence of other abilities, and from the existence of mathematical prodigies. Some idiot savants have shown great ability in the mathematical intelligence (Nolen, 2004:116).

Occupations that draw heavily on logical/mathematical intelligence include mathematicians, computer programmers, financial analysts, accountants, engineers and scientists (Gardner, 1983:135).

3.4.4 Spatial intelligence

Spatial intelligence involves the ability to manipulate and create visual mental images to solve problems. "*Spatial thinkers perceive the visual world accurately, to perform transformations and modifications upon one's initial perceptions, and to be able to re-create aspects of one's initial perceptions, even in the absence of relevant physical stimuli*" (Gardner, 1983:173; Gardner *et al.*, 1996:207). Much of the ability of spatial intelligence grows out of the visual world, yet blind people can also have spatial intelligence. If an individual can recognize an object from different angles, imagine movement among parts of a configuration, or think about spatial relations in which the body orientation of the observer is an essential part, one is said to have spatial intelligence (Gardner, 1983:175). Central to spatial intelligence are the capacity to perceive the visual world correctly, to perform transformations and modifications upon one's initial perception and to be able to re-create aspects of one's visual experience, even in the absence of relevant physical stimuli (Gardner, 1983:173).

The most elementary operation, upon which other aspects of spatial intelligence depend, is the ability to accurately perceive a form or an object (Gardner, 1983:174).

Spatial intelligence entails a number of loosely related capacities: the talent to recognize instances of the same component; the ability to transform or to recognize a transformation of one component into another; the capacity to conjure up mental image and then to transform these images; the capacity to produce a graphic likeness of visual-spatial information and the like (Gardner, 1983:176).

Learners with visual/spatial intelligence have "*(t)he ability to visualize objects and spatial dimensions, and create internal images and pictures*" (Gardner, 2001). This intelligence involves the use of shapes, colours and relationships among objects and it gives learners the ability to manipulate and create mental images to solve problems.

Learners with this type of intelligence may make statements such as "*I often draw or doodle during class, I enjoy building blocks or other objects, I can draw pretty well*" (Nolen, 2003). "*Plays with pictures*" is another way of describing these learners (Nelson, 1998). These learners enjoy jigsaw puzzles and mazes and they enjoy finding hidden pictures in puzzles, constructing things with blocks, drawing, designing and looking at pictures, slides, videos and films (Nolen, 2004:117)). Imaging is interesting and easy for these learners and puzzles, reading charts and maps entertain them. According to Nelson (1998), these learners have the potential for representing the spatial world internally in their minds. Hoerr (2004:42) states that they have the ability to perceive the world accurately and to recreate or transform aspects of the world.

Graphic designers, painters and sculptors are individuals with good spatial intelligence.

3.4.5 Bodily-Kinaesthetic intelligence

Bodily-kinaesthetic intelligence entails the ability to understand the world through one's body and to express oneself through one's body. Characteristic of bodily-kinaesthetic intelligence is the "*ability to use one's body in highly differentiated and skilled ways, for expressive as well as goal directed purposes*" (Gardner, 1983:206). Hoerr (2004:42) defines bodily-kinaesthetic intelligence as the potential for using one's whole body or parts of the body in areas such as athletics, dancing, acting, crafting and using tools. According to Nelson (1998), it is the ability to use the body skilfully and handle objects adroitly. This intelligence challenges the popular belief that mental and physical activities are unrelated (Brualdi, 1996).

Learners with highly developed bodily-kinaesthetic intelligence can use their bodies in very expressive and skilled ways for distinct purposes. Learners with this intelligence skilfully manipulate objects, like movement, making things and touching. Their communication is normally through body language and is taught through physical activity, hands-on learning, and acting out, role-playing. They have excellent fine motor skills of the fingers and hands and can control their gross motor movements very well (Gardner, 1983:206). These skills support their abilities to accurately manipulate objects and to carry out delicate and precise movements. People such as surgeons, sculptors, carpenters, plumbers, athletes, gymnasts, choreographers and dancers display these abilities (Gardner, 1983:222).

The biological underpinnings of bodily-kinaesthetic intelligence are complex and it involves the interplay between neural, muscular and perceptual systems (Gardner, 1996:209). Gardner speculates that the development of bodily/kinaesthetic intelligence advances from early reflexive actions such as sucking, to increasingly more intentional activities (Gardner *et al.*, 1996:209).

Learners with this specific intelligence may make statements like "*I am involved in a regular exercise program. I enjoy spending time doing physical activities. I willingly take part in school sports; I learn better when I am able to touch what I am learning about*" (Berman, 1995). Berman (1995) describes these learners as "*playing with movement*". In a traditional classroom, these learners stand the risk of being labelled "*overly active*" (Armstrong, 1998). Teachers should not misconstrue this type of learning as hyperactivity, because it is simply an active learner trying to make the most out of information they are subjected to. Hence learners with this kind of intelligence have capacities such as control of "*voluntary movements*", control of "*pre-programmed*" movements, an expanding awareness through the body, the mind and body connection, mimetic abilities and improved body functioning (Lash, 2002).

Armstrong (1994) recommended that teachers should focus on enhancing bodily/kinaesthetic intelligence so that learners can be guided to understand how they can use their bodies to retain information through clapping, jumping and role-playing in the classroom. Sports, drawing, carving, body acting and dancing are examples of activities that depend on this type of intelligence (Gardner, 2001).

3.4.6 The Personal intelligences

The capacity to know oneself and to know and effectively relate with others is as *inalienable a part of the human condition as is the capacity to know objects or sounds* (Gardner, 1983:243).

3.4.6.1 Interpersonal intelligence

Human beings thrive and grow by being involved with other people. People have the need to know and understand the inner feelings and thoughts of others to shape their own actions accordingly (Hoerr, 2004:41). Gardner (1983:239) names this inner need to acknowledge and understand the feelings and thoughts of others, interpersonal intelligence. Interpersonal intelligence is the "*ability to interact with others*", understanding them well, and interpreting their behaviour, such as thinking, goals, temperaments, moods, desires, motivations, and feelings through verbal and non-verbal communication (Guignon, 1998).

The core capacity of interpersonal intelligence is the ability to notice and make distinctions among individuals, in particular as far as their moods, temperaments, motivations and intentions are concerned (Gardner, 1983:239). Stated in its most elementary form, interpersonal intelligence entails the capacity of the young child to discriminate among individuals around him/her and to detect their various moods. In an advanced form, interpersonal knowledge enables a skilled adult to "read" the intentions and desires of others, even when these are hidden (Gardner, 1983:239).

According to Nelson (1998), interpersonal intelligence provides the basis for working with others, understanding people, leading and organizing others, communicating with others, resolving conflict between people and selling things/ideas to others. It is the ability to understand people's feelings, intentions and motivations. Interpersonal individuals are those who can inspire and lead people to achieve great goals such as freedom and independence. Mahatma Gandhi is Gardner's best example of such an individual (Gardner, 2001; Hoerr, 2004:42).

Examples of people who possess this type of intelligence are teachers, sales people, social directors, travel agents, politicians, religious leaders and therapists (Anon, 2006; Guignon, 1998).

According to Nolen (2004:117), individuals with high interpersonal intelligence may make statements such as "*spending time with friends helps me unwind*". *I would much rather learn new material with a group of people, I am more productive when I work with a team*". Learners who possess high interpersonal intelligence may be described as "*plays with socializing*" (Berman, 1995). These learners are group/people oriented, work well with others through interactions, and being alone may be considered complete loneliness; because interpersonal feelings and intentions of others are concerns of these learners (Brualdi, 1996; McKenzie, 1999). Nelson (1998) states that these learners understand people and how to facilitate relationships and group processes.

Interpersonal intelligence is an intelligence that is critical for learning (Davis, 2004:16). Educators should allow learners to interact/co-operate with their classmates in order to gain more knowledge concerning a particular topic (Gardner, 1983).

While personal intelligence appears to be a simple construct, different cultures and customs should be carefully considered, because what is regarded as normal inter-personal behaviour in one culture, may be offensive in another one (Davis, 2004:16).

3.4.6.2 Intrapersonal intelligence

Intrapersonal intelligence is vital for self-understanding (Gardner, 1997). The potential for understanding ourselves, recognition of one's strengths and weaknesses and setting personal goals lies in intrapersonal intelligence (Nelson, 1998). According to Hoerr (2004:42), intrapersonal intelligence makes access to one's emotional life possible and helps us to understand ourselves and others better.

Learners with high intrapersonal intelligence have the capacity to accurately know themselves, and to understand their own interests, goals, strengths, motivation, determination, ethics, integrity, imagination, thoughts and innermost feelings (Armstrong, 1998; Nelson, 1998). These learners are in tune with their inner feelings, have wisdom, intuition and motivation, are strong willed, confident, have their own opinions and are in touch with their own values and ideas (Armstrong, 1998; Brualdi, 1996; McKenzie, 1999).

Intrapersonal intelligence depends on core processes that enable people to interpret and understand their own feelings (Gardner, 1996:209). Gardner sees intrapersonal

intelligence as developing from the primitive ability to distinguish pleasure from pain and to act on that discrimination. Gardner (1996:211) also equates intrapersonal intelligence with a "*central intelligence agency*", which enables individuals to know and understand their own abilities and how to best utilize them.

According to Berman (1995), the following statements are common among intrapersonal learners: "*Processing my thoughts alone is very important to me., I regularly think about my day and reflect on what I have accomplished". "I enjoy spending time by myself*". Nelson (1998) and Brualdi (1996) mention that high intrapersonal intelligence brings about high self-esteem, self-discipline, self-enhancement, and strength of character which will help the individual to solve personal problems better.

3.4.7 Naturalist intelligence

Recently, Gardner added an eighth intelligence called naturalist intelligence to his MI theory (Gardner, 2001). Individuals with high naturalist intelligence have the ability to distinguish between, identify and classify patterns in nature and utilize features of the environment.

According to Nelson (1998), naturalist intelligence refers to the individual's potential to discriminate among plants, animals, rocks and other phenomena in the natural and biological world, to understand and respect nature, to make distinctions and to identify flora and fauna. It is the ability to recognize and classify the numerous species, the flora and fauna in the world of nature (Hoerr, 2004:42).

Learners who possess naturalist intelligence will be able to identify birds, plants and stars, as well as describe the different makes of cars around them (Holmes, 1999). Learners with naturalist intelligence love the outdoors, animals and field trips and they understand subtle differences in their environments/eco-systems (McKenzie, 1999). Nature inspires these learners in many different ways. They feel relaxed and energized when they interact with nature. Examples of people who score high on this type of intelligence are farmers, hunters, gardeners, botanists, geologists, florists and archaeologists.

3.4.8 Candidate intelligences

Apart from the eight multiple intelligences so far discussed, spiritualist and existentialist intelligences are new candidate intelligences (Denig, 2004:99). Spiritualist intelligence refers to the ability to discern our spirituality, the need for spiritual attention, and the desire to commune with the divine; whereas individuals endowed with existentialist intelligence would be concerned about basic questions regarding their existence (Gardner, 2001). Gardner sees existential and spiritual intelligence as similar, with existential intelligence being more narrowly defined and spiritual intelligence being more broadly defined (Denig, 2004:99). Gardner (1999:64) questions both of these intelligences because they do not meet all the criteria other intelligences so well meet.

3.5 Key aspects of the MI Theory

Having described each intelligence it is important to emphasize that all people draw on combinations of several intelligences (Gardner, 1993). For example, dancers need to rely on bodily/kinaesthetic intelligence, but they must also possess musical intelligence to move expressively and in correct rhythm. They must make use of their personal intelligence if they want to interpret and portray certain characters. It may seem that mathematicians could rely solely on logical/mathematical intelligence, but they must also draw on interpersonal intelligence to get their work published and to get along in a university faculty (Gardner *et al.,* 1996:211).

Gardner argues that all normal people are capable of drawing on all the intelligences, but individuals are distinguished by their particular "*profile of intelligences.*" This profile features their own, unique combination of relatively stronger and weaker intelligences and these relative strengths and weaknesses help to account for individual differences (Gardner *et al.*, 1996:211).

Beyond the descriptions of the eight intelligences and their theoretical underpinnings, certain aspects of the theory are important, according to Armstrong (2000:8).

3.5.1 Each person possesses all eight intelligences

MI theory is not a "type theory" for determining the one intelligence that fits a person best. It is "*a theory of cognitive functioning and it proposes that each person has capacities in al eight intelligences*" (Armstrong, 2000:8). The eight intelligences function

together in ways that are unique to each individual. Some people appear to have very high levels of performance in all or most of the eight intelligences. Armstrong (2000:9) states that most individuals fall somewhere in between these two poles – being highly developed in some intelligences, modestly developed in others, and relatively under-developed in the rest.

3.5.2 Most people can develop each intelligence to an adequate level of competency

While an individual may regret his deficiencies in a given area and consider his/her problems innate and intractable, Armstrong (2000:9) suggests that virtually everyone has the capacity to develop all eight intelligences to a reasonably high level of performance if given the appropriate encouragement, enrichment and instruction.

3.5.3 Intelligences usually work together in complex ways

Gardner (1983:67) indicates that each intelligence is actually a "*fiction*"; that is, no intelligence exists by itself in life. Intelligences are always interacting with each other. To bake a cake, one must read the recipe (linguistic), possibly divide the recipe in half (logical/mathematical), develop a creative decoration that satisfies all members of the family (interpersonal) and placate one's own appetite as well (interpersonal). Similarly, when a child plays a game of rugby or netball, he needs bodily-kinaesthetic intelligence (to run, throw and catch), spatial intelligence (to orient him/herself on the playing field and to anticipate the trajectories of flying balls), and linguistic and interpersonal intelligences (to successfully argue a point during a dispute in the game) (Armstrong, 2000:9).

3.5.4 There are many ways to be intelligent within each category

There is no typical set of attributes one must have to be considered intelligent in a specific area (Armstrong, 2000:9). As a result, an individual may not be able to read, yet be highly linguistic because he can tell a very interesting story or has a large oral vocabulary. Similarly, a person may be quite awkward on the playing field, yet possess superior bodily–kinaesthetic intelligence when he/she plays chess. MI theory

emphasizes the rich diversity of ways in which people display their abilities within intelligences as well as between intelligences (Armstrong, 2000:9).

3.6 Impact of MI theory on teaching and learning

MI theory has the potential to make a positive impact on both teachers and learners. Teachers who plan and organize instruction around the learning preferences of individual learners, emphasizing special strengths and supporting underutilized gifts and talents, may unlock the full learning potential of their learners. The benefits of implementation of the MI theory in daily instruction relate to better academic achievement, effective assessment strategies and increased self-esteem and learner motivation (Kornhaber, 2001:276; Rettig, 2005:255).

3.6.1 Teaching

The implications of the eight intelligences for teaching/learning are enormous. Traditionally educational institutions tend to focus mostly on only two intelligences, namely verbal/linguistic and logical/mathematical and teachers essentially teach, assess, reinforce and reward these intelligences (Barrington, 2004:423). Though most teachers use a variety of teaching strategies, teachers often base their teaching strategies on their own learning styles and intelligences (Gardner *et al.,* 1996:212).

For example, a teacher who has a strong linguistic intelligence will give preference to a whole language-based approach in his/her teaching and assessment. This entails reading, writing, speaking and conversing in one's own or foreign languages (Armstrong, 1998:2). Learners with more concrete (non-verbal) learning styles may experience problems with this approach, unless the teacher stays alert to their intellectual needs and learning preferences (Berman, 1995). Thus, even though a linguistic approach will enhance the linguistic intelligence of learners, the teacher's teaching strategies must link up with their other intelligences to meet the learning needs of all learners (Brualdi, 1996). Davis (2004:6) found that learners have a tendency to become bored when they are not fully engaged in the learning process. Low interest in learning and underutilized learning preferences have been suggested as underlying causes of learner's disengagement and low academic performance. Therefore teachers need to become aware of the multiple intelligence theory and take inventory of their learners' intelligences and learning preferences (Gardner *et al.,* 1996:212).

Stanford (2003:82) states that the MI theory can make a great contribution to education. He suggests that teachers should expand their teaching repertoire of strategies, techniques and tools beyond the typical linguistic and logical approaches that are predominantly used in classrooms. MI theory helps teachers to go beyond the text and create a variety of teaching tools to meet the needs of all learners (Armstrong, 2000:51; Stanford, 2003:82).

MI theory provides a framework for teachers to reflect on their best teaching methods and to understand why these methods work. MI theory opens the door to a wide variety of innovative teaching strategies that can easily be implemented in the classroom (Stanford, 2003:82). MI theory offers a teaching approach that can provide teachers with innovative teaching strategies, novel ways to stimulate learning, and plans that suit the ability levels of individual learners (Davis, 2004:14). Such a personalized teaching approach makes it possible for teachers to teach in accordance with state-mandated standards (Gardner, 1993; Chapman, 1993). In fact, Gardner (1993) stated that this approach focuses on a variety of learners' abilities (Davis, 2004:14) and that it promotes hands-on teaching methods.

Teachers utilizing the MI theory provide daily learning experiences geared towards the unique learning abilities of individual learners (Davis, 2004:15). Equally important is the fact that MI theory offers learners the opportunity during co-operative learning situations, to interact in meaningful dialogue with their peers to negotiate, solve problems and communicate understanding of concepts (McBeath, 1994). Learners are provided the opportunity to explore various ways of learning, get out of comfort zones, be creative and have fun. The classroom provides encouragement, support and confidence in the learner's ability to succeed (Lefebvre, 2004:52). Ultimately, the learner is challenged to become accountable for his or her own learning and behaviour.

In fact, the application of MI theory will be beneficial to learners who experience barriers to their learning because it emphasizes their strengths. Teachers can use MI strategies to enrich the curriculum to assist all learners to become successful learners (Davis, 2004:15; Greenhawk, 1997). Using MI strategies enables the teacher to develop plans that are unique to the ability levels of learners (Armstrong, 1994). Davis (2004:15) claims that educators using MI strategies in the classroom will tailor make teaching and learning in accordance with the needs of every child.

Information on MI theory is helpful to everyone, especially for people with learning disabilities and Attention Deficit Disorder (Anon., 2006:1). Knowing your intellectual strengths and limitations and understanding your learning preferences will assist you in developing coping strategies to compensate for your weaknesses and capitalize on your strengths. If school policy is based on a multiple intelligence framework, schools will promote and respect individual differences and preferences (Eisner, 2004:36).

According to Kornhaber (2004:68), educators adopt the MI theory for a well-defined set of reasons first. According to Kornhaber (2004:68), educators state that MI theory validated what they already knew and second, their observations were already aligned with the theory's premise that people learn in a variety of ways. Furthermore, MI theory provides a framework for developing teaching strategies that will enable teachers to implement a large repertoire of teaching methods in classrooms (Kornhaber, 2004:69).

By using MI theory, teachers develop a holistic approach to education (Kornhaber, 2001:276). Howard Gardner believes teachers should teach to multiple intelligences during lessons because it will help learners to relate the knowledge to real world experiences (Smith, 2002:6). By incorporating all eight intelligences teachers are helping learners to become lifelong learners and productive members of society. Cognizance of the eight intelligences also helps teachers to teach in eight different ways instead of one (Kornhaber, 2001:276).

Unfortunately, according to Hanley *et al.* (2002:18), teachers occasionally find it difficult to teach to learners' preferred learning styles and to let learners take charge of their learning in accordance with their preferred learning styles. Rettig (2005:255) states that although teachers find it difficult to implement new teaching strategies, teachers can and should make use of MI theory to promote learning and development. An emphasis on multiple intelligences in teaching and learning may help learners to discover what they are good at and it will help them to focus on their abilities rather than disabilities (Rettig, 2005:256).

3.6.2 Assessment

Changing teaching strategies without changing assessment strategies will not bring about the full benefit of MI theory for teaching and learning (Stanford, 2003:82). Thus, if MI is to be used in classrooms, teachers must change the way they assess learning. MI theory brings about an awareness of the implementation of different assessment

strategies that will allow learners to demonstrate that they understand and can apply new information in unique ways (Stanford, 2003:82).

Lefebvre (2004:52) asks the question whether assessment should focus on the improvement of learners' learning or on their accountability and the quality of learning produced. According to Lefebvre (2004:52), it is important to ensure that assessment methods are as fair as possible in assessing whether learners understand the work. According to Chapman (1997), a fair assessment is one in which learners are given equitable opportunities to demonstrate what they know. Lefebvre (2004:53) states that learners view it as very important to have options of choosing how to demonstrate their learning.

In traditional learning environments static means to assess what learners have learned are usually used. More specifically, standardized testing is generally used to assess learners' knowledge of the material supposedly being learned (Lash, 2002:15).

Gardner advocates strongly for the development and adoption of "intelligence-fair" assessments (Gardner *et al.*, 1996:212). These are assessments that allow learners to demonstrate their abilities by implementing "intelligence appropriate" media and contexts, rather than relying exclusively on paper-and-pencil tests.

MI theory proposes a fundamental restructuring of the way in which teachers assess their learners' learning progress (Armstrong, 2000:88). It recommends an assessment system that relies far less on formal standardized or norm-referenced tests and much more on authentic measures that are criterion–referenced, benchmarked, or *"ipsative"* (that compare a learner to his/her own past performances) (Armstrong, 2000:88). Authentic assessment offers opportunities for learners with learning disabilities by providing an alternative means of assessing their growth and development (Stanford, 2003:83).

When teaching strategies are aligned with the theory of multiple intelligences, alternative assessment strategies should be followed to account for the various intelligences and to reveal the different kinds of knowledge each individual has acquired, rather than expecting or assuming that all learners will demonstrate the same learning outcomes (Lash, 2002:15). Teachers' anxieties about learner performance and progress often lead to remedies that stress uniformity of content, uniformity of assessment procedures and uniformity of outcomes (Eisner, 2004:33). However, multiple intelligences theory

praises another ideal where variance in learner performance is considered a virtue and not a vice (Eisner, 2004:35).

In an MI classroom, assessment is of high quality and ongoing (Stanford, 2003:84). Since teaching and assessment go hand in hand, teachers are constantly assessing learners' knowledge and skills. The MI classroom allows the teacher to take control of varying teaching and assessment strategies that will help to meet the needs of all learners (Stanford, 2003:84).

3.6.3 Self-esteem and motivation

Barrington (2004:423) makes the point that restricting educational programmes to focus only on linguistic and mathematical intelligences minimizes the importance of other forms of knowing and those learners who fail to demonstrate the traditional academic intelligences are often held in low self-esteem and their strengths may remain unrealized and lost to both the school and society at large. This lack of confidence in turn affects the learner's success at school.

Campbell (1992) indicates that it is critical for teachers to implement the MI theory in classrooms to help learners experience learning success (Davis, 2004:16). Balanos (1996) found that an MI-based curriculum can improve learner self-concept and Teele (1996) indicated that intellectual empowerment increases learner motivation to utilize their diverse talents and skills. According to Smerechansky-Metzger (1995:14), as stated by Davis (2004:16) the implementation of MI theory in the classroom will motivate learners and give them the self-confidence to achieve. If implemented in educational settings, MI strategies will promote cooperative learning, self-directed learning, leadership roles, and greater academic achievement and retention due to enjoyment of the activities.

Studies conducted at schools using Multiple Intelligence theory (SUMIT) have shown that by incorporating the eight intelligences in the teaching and learning programme, learner motivation towards school has increased (Kornhaber, 2001:276). Implementation of MI theory can help learners who do not experience success in school and lack motivation (Stanford, 2003). Teaching learners about their multiple intelligences may enhance their developmental process, giving them more opportunities to feel confident about their abilities (Mettetal, Jordan & Harper, 1997:115).

Armstrong (1994) and Davis (2004:16) found that the implementation of an MI-based curriculum can improve a learner's self-concept. Campbell (1999) supports this finding by stating that implementation of the MI theory can enhance the learning process and therefore promote learner self-esteem. Teele (1996) found that empowering learners to use their diverse talents and skills has increased their motivation to learn.

Kornhaber (2004:72) found that the implementation of MI theory will benefit learners with learning disabilities because the theory supports the idea that these learners have strengths and not only weaknesses. Acknowledging and supporting these strengths will lead to academic as well as motivational benefits.

3.7 Critique of the MI Theory

MI theory has existed long enough to be criticized on both theoretical and applied, or educational grounds (Gardner, 1983:212). On the theoretical front, Scarr (as quoted by Gardner *et al.*, 1996:219) has criticized Gardner for constructing MI theory on the premise that psychology regards intelligence as a unitary ability reflected by IQ scores. According to Gardner *et al.* (1996:219), Scarr argues "*that labeling diverse abilities, such as bodily-kinesthetic, social and musical skills, as intelligence does not advance the understanding of intelligence, personality or areas of special ability like music or movement*". Scarr (1985) further argues that Gardner's claims for the various intelligences are motivated more by social than scientific considerations. She claims that calling diverse talents "intelligences" does not "solve the problem of social allocation". Gardner's counter arguments to such criticisms are that the common practice of regarding only language skills and logic as intelligence, reflects the Western tradition and ways of thinking about intelligence and the influence of intelligence testing (Gardner *et al.*, 1996:213).

Gardner has also been criticized for not contributing a clear curriculum for teachers to follow when implementing MI theory in schools (Gardner *et al.*, 1996:13). Indeed, *Frames of Mind* (Gardner, 1983) included only a few paragraphs to indicate how the theory might be used in the teaching of reading and computer programming (Gardner *et al.*, 1996:213). Thus schools have used the theory in diverse ways, "*some brilliant, some idiotic*" (Gardner, 1995:581). In his defence, Gardner argues that theories may be put into practice in different ways, some with direct guidance and others by practitioners with direct guidance from their originators. Gardner speculates that MI theory has been

adopted in the latter way because it allows teachers to look more carefully at learners, to examine their own assumptions about potential and achievement, to consider a variety of approaches to teaching and to try out alternative forms of assessment (Gardner, 1995:582; Gardner *et al.*, 1996:213).

Armstrong (1994:28) noted that the theory of multiple intelligences makes things simpler for teachers and learners. By chunking the broad range of human abilities into basic intelligences, a map is provided for making sense of the many ways in which children learn and a blueprint is provided for ensuring their success in school and life. Teachers can use MI strategies to enrich the curriculum to assist all learners to become more successful lifelong learners (Greenhawk, 1997).

3.8 Conclusion

By encouraging learners to utilize their multiple intelligences they are more likely to experience personal meaning in their studies, and their learning can be greatly enhanced. Such an approach could change the negative views many learners have about their learning environment.

In the subsequent chapter the method of research which was followed in the empirical part of the study will be described.

CHAPTER 4
METHOD OF RESEARCH

4.1 Introduction

In Chapter 2 the diagnostic criteria, core symptoms, prevalence and aetiology of ADHD were discussed. Attention was also given to the impact of ADHD on the relationships of ADHD children with peers, parents, siblings and teachers as well the profiles of ADHD learners in regular classrooms.

The theory of multiple intelligences and its implications for the teaching of ADHD learners were addressed in Chapter 3.

In this chapter the method implemented to answer the stated research problems and to achieve the aims of the research will be discussed.

4.2 Research problems

For purposes of this research, the following research problems were formulated:

4.2.1 Primary research problem

What do the MI-profiles of ADHD learners reveal in terms of their intellectual strengths and weaknesses?

4.2.2 Secondary research problems

The following secondary research problems, which are related to the above-mentioned primary research problem, were formulated:

- Is there a significant difference between the MI profiles of ADHD and non-ADHD learners; and
- What are the implications of the ADHD learners' MI profiles for their teaching and learning?

4.3 Research aims

The following research aims were formulated in accordance with the above-stated research problems:

4.3.1 Primary research aim:

The primary research aim was to determine what the MI Profiles of ADHD learners reveal in terms of their intellectual strengths and weaknesses.

4.3.2 Secondary research aims

The secondary research aims were to determine

- whether the MI profiles of ADHD and non-ADHD learners differ significantly; and
- what the implications of the ADHD learners' MI profiles are for their teaching and learning.

4.4 Research design and methodology

To answer the research questions and achieve the aims of the research, the researcher followed a quantitative, non-experimental descriptive design. Johnson (2001:3) states that non-experimental research is a viable research approach for educators because there are so many non-manipulable independent variables those researchers have to contend with in the field of education. Non-experimental studies are usually undertaken in educational research because most human characteristics or independent variables are not subjected to experimental manipulation or randomization and in some situations it is more realistic to explore phenomena in a more descriptive, non-experimental manner (Johnson, 2001:3).

4.4.1 Study population and participants

All the Grade 4-7 learners attending five Section 21 primary schools (ex-model C schools) in the D12 school district (Roodepoort) of the Gauteng Province served as the study population from which two groups of participants were selected, namely:

- An ADHD-group consisting of all Grade 4-7 learners in the above mentioned schools (124) who have been diagnosed by professionals (psychologists and medical doctors) with the combined* type of ADHD and placed on medication, and
- A control group consisting of 120 Grade 4–7 learners who have been randomly drawn from the class lists of the above-mentioned schools and who did not display any symptoms of ADHD and had never been diagnosed with ADHD.

*According to Armstrong (1999:75) and Bester (2006:18), approximately 85% of learners diagnosed with ADHD present with the symptoms of the combined type (Type 3). For this reason only Type 3 learners participated in this study.

Biographical information concerning the participants is displayed in Table 4.1.

Table 4.1: Biographical information concerning the participants

		ADHD	NON-ADHD	TOTAL
Number		124	120	**244**
Gender	Males	79	45	124
	Females	45	75	120
	Total	124	120	244
Grades	4 & 5	75	56	131
	6 & 7	49	64	113
	Total	124	120	244
Language	Afrikaans	45	103	148
	English	79	17	96
	Total	124	120	244

It is evident from Table 4.1 that a total number of 224 learners (124 males and 120 females) from Grades 4-7 participated in the study. The ADHD group consisted of 124 learners (79 males and 45 females) who met the DSM-IV criteria (American Psychiatric Association, 1994) for the combined type of ADHD. The Non – ADHD group comprises 120 learners (45 males and 75 females). The ratio of male and female participants in

the ADHD group approximates the gender prevalence estimates suggesting that ADHD is more frequently diagnosed in male than in female individuals (American Psychiatric Association, 1994).

The number of participants in Grades 4 and 5 were 131, and 113 learners in Grades 6 and 7 took part in the study. As far as the preferred language of teaching of the participants is concerned, 148 learners received their teaching through the medium of Afrikaans and 96 were taught through the medium of English.

4.4.2 Data collection instrument and procedure

4.4.2.1 Theoretical background and development of the instrument

Gardner defines intelligence as "... *a biopsychological potential to process information that can be activated in a cultural setting to solve problems and create products that are of value in a culture"* (Gardner, 1999:34).

This definition stresses the interaction between the individual's biology and the cultural context and includes both convergent and divergent cognitive abilities. Such a broad-based definition of intellectual potential cannot be adequately measured via short-answer to short-question, convergent problem solving tests (Shearer, 2006:3). Thus a systemic and dialectical approach was required to create a multiple intelligence assessment tool that has ecological validity.

The *Multiple Intelligences Developmental Assessment Scales for Children* (MIDAS-KIDS) for age groups 6-14 developed by Branton Shearer (Shearer, 1997) was used to assess the multiple intelligences of the participants. This instrument is a self-report questionnaire that can be administered and interpreted by teachers, counselors and psychologists.

The aim of the MIDAS-KIDS is to facilitate a "process approach" to assessment that begins with the completion of an in-depth self-report that surveys a wide range of everyday behaviours associated with the different types of intelligence as described in Chapter 3. The main goal is to provide a reasonable estimate of the child's MI disposition in order to promote personal satisfaction and, academic and career success through enhanced self-awareness and differentiated instructional support (Shearer, 1996:63).

4.4.2.2 Contents and format of the questionnaire

The MIDAS-KIDS consists of eight scales with their own subscales. There are two intellectual style scales in MIDAS-KIDS – innovation and technical. Each scale consists of questions that contribute directly to the score of the designated scale plus a few questions that contribute to the score of a different scale. This occurs because the activity depicted in a particular question may require more than one dominant intellectual skill for its successful completion. Respondents are encouraged to respond thoughtfully to each question as if they are participating in a structured interview session.

The MIDAS-KIDS consists of the following scales, subscales and intellectual style scales:

Scale 1: Musical

Subscales: Musicality
Vocal
Appreciation
Instrument

A few examples of questions included in this scale and the subscales are:

- *Do you think you could be a really good musician or singer if you tried?*
- *How well can you sing?*
- *Do you often create songs as you go just for the fun of it, like when you play for instance?*
- *Did you ever learn to play an instrument or take music lessons?*

Scale 2: Kinaesthetic

Subscales: Physical ability
Dance
Working with hands

A few examples of questions included in this scale and the subscales are:

- *How well can you run, jump, skip, hop or gallop?*
- *How well can you dance or move on time?*
- *How well can you use your hands to play the jackpot, mix cards or perform trickery?*

Scale 3: Logical/mathematical

Subscales: Problem solving
Calculations

A few examples of questions included in this scale and the subscales are:

- *Do you like science, solving problems, measuring and doing experiments?*
- *When you were young, how easily did you learn your numbers and counting?*

Scale 4: Spatial

Subscales: Artistic
Constructions
Imagery

A few examples of questions included in this scale and the subscales are:

- *Do you like to decorate your room with pictures, or posters, drawings, etc.?*
- *How good are you at taking things apart and then putting them back together again? For instance models, toys, building sets or puzzles*
- *Do you like inventing cards, clothes or inventions?*

Scale 5: Linguistic

Subscales: Linguistic sensitivity
Writing
Reading

A few examples of questions included in this scale and the subscales are:

- *How well do you memorize poems, songs or rhymes by heart?*
- *How well can you write a note or letter to someone?*
- *How hard was it for you to learn the alphabet or learn how to read?*

Scale 6: Interpersonal

Subscales: Leadership
Understanding people
Getting along with others

A few examples of questions included in this scale and the subscales are:

- *How well can you help other people solve conflict, like for instance two friends?*
- *Do you ever try very hard to understand the feelings of other people?*
- *How easy is it for you to make a new friend?*

Scale 7: Intrapersonal

Subscales: Self-knowledge
Managing feelings
Effective relationships
Goal achievement

A few examples of questions included in this scale and the sub-scales are:

- *Do you enjoy working on writing projects?*
- *Is it difficult for you to control your emotions and temper?*
- *Do you ever offer to help people around the house or in school?*

- *Is it easy for you to switch from one activity and get started on another when you have to?*

Scale 8: Naturalist

Subscales: Animal care
Earth science

A few examples of questions included in this scale and the sub-scales are:

- *Have you ever raised a pet or other animal?*
- *Are you ever curious about nature and do you ever search for animals in the bush, collect plants, insects or other things?*

Intellectual style scales: Technical
Innovative

A few examples of questions included in this scale and the sub-scales are:

- *How well can you sing?*
- *How good are you in mathematics?*
- *Do you often have a tune or song playing in your head, hum or sing to yourself?*

4.4.2.3 Translation of the questionnaire

The MIDAS was purchased by the researcher and translated into Afrikaans by an independent and accredited translator. The translated version of the questionnaire (in Afrikaans) was translated back into English by another independent and accredited translator to ensure that the content and meaning of the items did not change.

4.4.2.4 Validity and reliability of the instrument

The MIDAS has been subjected to international scrutiny and was found to be a valid and reliable instrument to assess multiple intelligences (Shearer, 2005:150).

As far as reliability is concerned, Shearer (1996) reported MIDAS alpha coefficients ranging from 0.78 to 0.89 (median = 0.86). Test-retest reliability of the MIDAS was assessed in two separate investigations revealing one-month stability coefficients ranging from 0.76 tot 0.92 (mean = 0.84) and two-month stability coefficients ranging from 0.69 tot 0.86 (mean = 0.81) across the various intelligence scales (Shearer, 1996).

In order to determine the internal-consistency reliability of the MIDAS-KIDS for the sample of South African learners (English and Afrikaans speaking) who participated in this study, Cronbach-Alpha coefficients were calculated for each of the eight scales. Internal- consistency refers to the degree of relatedness of the items in a questionnaire (Rosnow & Rosenthal, 1996:124). In other words, internal consistency reliability refers to the extent to which the items in a single instrument yield similar results (Leedy & Ormrod, 2005:93). Cronbach's Alpha measures how well a set of items in a questionnaire measure a single latent construct.

Table 4.2 displays information concerning the Cronbach-Alpha coefficients obtained for the different scales of the MIDAS-KIDS.

Table 4.2: Cronbach-Alpha coefficients for the different scales of the MIDAS-KIDS (South African sample)

Scale	Cronbach-Alpha Coefficients (Raw)
Musical	0.82
Kinaesthetic	0.81
Mathematics	0.82
Spatial	0.85
Linguistic	0.80
Interpersonal	0.84
Intrapersonal	0.90
Naturalist	0.86

Considering the Alpha coefficients in Table 4.2, it can be concluded that the questionnaire has high internal consistency reliability.

4.4.2.5 Data collection

The MIDAS-KIDS was administered by the researcher and teachers who were trained as test administrators by the researcher.

The administration took place in a separate classroom during school hours. Rapport was established with the learners, and all attempts were made to reduce excitement and anxiety, as these factors could affect the performance of learners, especially the participants with ADHD. The participants were informed about the reasons for the administration and that their participation was completely voluntary. They were also informed about the confidential nature of their participation.

The participants' attention was focused on the directions and the space for personal information on the first and second pages of the questionnaire booklet. The administrators read the instructions out aloud to the participants and made sure that everybody understood what was expected of them. Afterwards the participants filled in their personal information, and the administrators checked individually that the required information was provided. Exactly the same procedure was followed at the different schools. The following instructions were read to the participants:

> *Think about this as an interview with yourself. You might be surprised by what you know about yourself when you think carefully.*
>
> *Where questions provide a few options, choose the one activity in which you are strongest and only judge yourself on that activity.*

Participants had to respond to the different questions contained in the various scales of the MIDAS-KIDS by using the following 6 point scale:

For example: *Did you ever learn to play an instrument or take music lessons?*

1. **A little bit**
2. **Reasonably**
3. **Well**
4. **Very well**
5. **Excellently**
6. **I don't know**

The first five questions were administered to the group with the assistance of the administrators to eliminate possible misunderstandings about the questions and the answering options. Thereafter the participants completed the questionnaire individually. Where necessary, the administrators continued to render individual assistance to participants, for example reading questions to participants with reading problems, or explaining the meaning of some words or phrases to them.

There was no time limit for completing the questionnaire. On completion of the questionnaire, each learner was allowed to leave the classroom.

The researcher did the coding of all the questionnaires herself.

4.4.2.6 *Statistical analysis*

Statistical Consultation Services of the North West University (Potchefstroom Campus) performed the data capturing and statistical analysis.

The following statistical calculations were done:

- The calculation of Cronbach-Alpha coefficients (see par. 4.4.2.4)
- Descriptive statistics: calculations of summary statistics, e.g. means, standard deviations. Tabulations of ranked data in a continuity table. Graphical representations using line plots as well as bar charts.
- Since convenience sampling was employed, no p-values were reported; instead effect sizes were calculated and interpreted where necessary. Effect size is independent of sample size and is a measure of practical significance (Ellis & Steyn, 2003). Practical significance refers to the practical importance of the results (Rosnow & Rosenthal, 1996:275). A result that is statistically significant does not necessarily have significant practical implications and vice versa. The following effect sizes were calculated:

  (i) To calculate the effect size for the difference between means the following formula was used: $d = \frac{|\overline{X}_1 - \overline{X}_2|}{S_{max}}$, where $\overline{X}_1$ = mean of group 1, $\overline{X}_2$ = mean of group and S_{max} = maximum standard deviation of the two groups respectively. According to Cohen (1988), the following guidelines for interpretation

can be used: $d = 0.2$ (small effect); $d = 0.5$ (medium effect); $d = 0.8$ (large effect)

(ii) The effect size for the relationship in a contingency table was calculated by using the following formula: $w = \sqrt{\frac{\chi^2}{n}}$, where χ^2 is the usual Chi-square statistic and n is the sample size. Cohen (1988) gives the following guidelines for interpretation, $w = 0.1$ (small effect); $w = 0.3$ (medium effect); $w = 0.5$ (large effect)

4.5 Ethical aspects

The Ethics Committee of the North-West University (Potchefstroom Campus) approved the research.

The researcher approached the Gauteng Department of Education for permission to conduct the research. (See Appendix 2.) Permission was granted on the basis that no school or participant would be identified, that the research would not impact negatively on the teaching and learning programmes of the schools in the study population and that schools and participants would participate on a voluntary basis.

The researcher approached the principals of the ex-Model C primary schools in the Roodepoort D12 District for permission to conduct the research in their schools. (See Appendix 3.)

Letters explaining the aims of the research were sent to the parents and informed consent forms were obtained.

4.6 Summary

In this chapter the method of research was discussed with reference to the research problems and aims, study population and participants and the data collection instrument.

In Chapter 5, the results and findings of the research will be discussed.

CHAPTER 5

RESULTS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In the previous chapter, the research method was discussed in terms of the research problems and aims, study populations and participants and the data collection instrument.

In this chapter, the results of the statistical analysis will be given and discussed, conclusions drawn and recommendations made.

5.2 The MI profile of ADHD learners

Means were calculated for the raw scores the ADHD participants obtained on the different scales and subscales of the MIDAS-KIDS. Information regarding these means can be found in Table 5.1 below.

Table 5.1: Means for the different scales and subscales of the MIDAS-KIDS: ADHD group

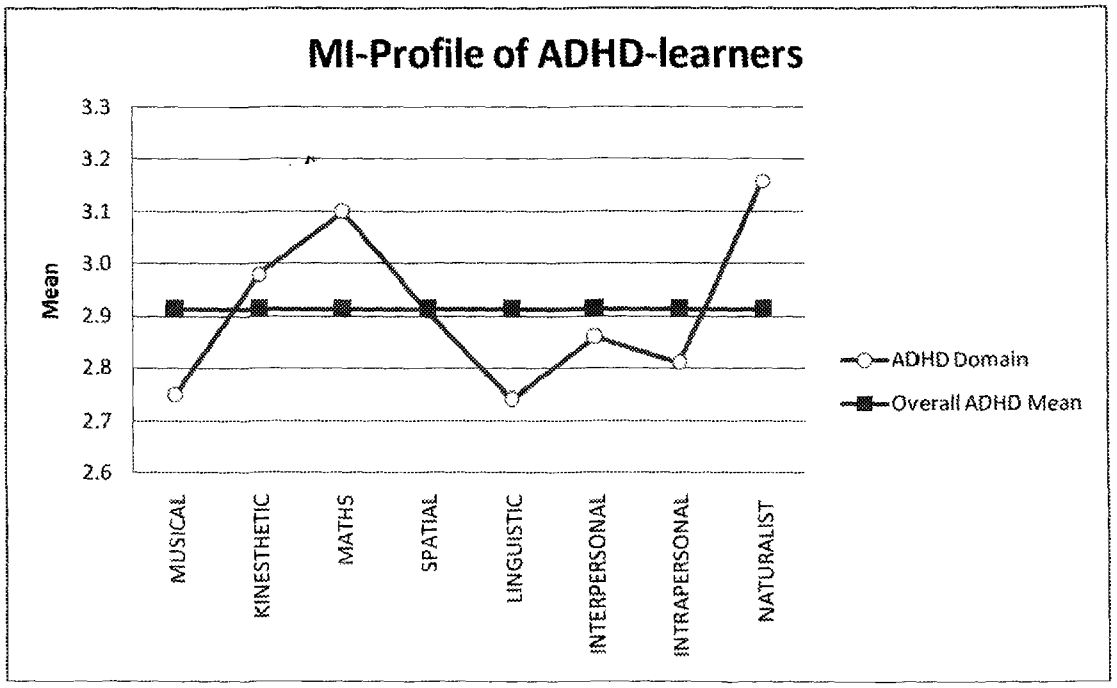
MIDAS-KIDS: SCALES AND SUBSCALES	MEANS
MUSICAL	2.75
Musicality	2.75
Vocal	2.86
Appreciation	2.93
Instrument	2.03
KINAESTHETIC	2.98
Physical	3.06
Dance	2.83
Hands	3.31
MATHS	3.10
Problem solving	3.07
Calculations	3.13

SPATIAL	2.91
Artistic	2.93
Construction	3.00
Imagery	2.80
LINGUISTIC	2.74
Sensitivity	2.86
Writing	2.45
Reading	2.80
INTERPERSONAL	2.86
Interpersonal leadership	2.61
Interpersonal understanding	2.84
Interpersonal get along	3.21
INTRAPERSONAL	2.81
Intrapersonal self-knowledge	2.79
Intrapersonal feelings	2.74
Intrapersonal relationship	2.95
Intrapersonal goal	2.79
NATURALIST	3.16
Naturalist animal	3.15
Naturalist earth	3.17
Technical	2.89
Innovative	2.78
TOTAL	**2.91**

No noteworthy high or low means are observed in the table given above. When the different scale means are considered, the highest mean obtained was on the Naturalist scale (3.16) and the lowest mean on the Linguistic scale (2.74)

The means for the different scales and the total mean are graphically presented in Figure 5.1 below.

Figure 5.1: MI profile of ADHD learners



No visible strengths or weaknesses in terms of very high or very low means are observed in the graph displayed above. Most of the scale means lie close to the total mean. The only two scales appearing to have visibly higher and lower means than the total mean are Linguistic and Naturalist.

5.3 Comparison between the MI profiles of ADHD and Non-ADHD participants

On the basis of the ADHD and Non-ADHD participants' responses to the different items contained in the main and subscales of the MIDAS-KIDS (see par. 4.4.2.2), means and standard deviations were calculated for the ADHD and Non-ADHD groups. These statistics, including the effect sizes (see par. 4.4.2.6), are reported in Table 5.2 directly below. A graphic illustration of the mean scores for the ADHD and Non-ADHD groups is also presented in Figure 5.2 further on.

Table 5.2: Means, standard deviations and effect sizes (*d*) for ADHD and Non-ADHD groups

MIDAS-KIDS: Scales and Subscales	GROUP						
	ADHD			NON-ADHD			
	n	Mean	Std deviation	n	Mean	Std deviation	Effect size (d)
MUSICAL	124	2.75	0.76	120	2.88	0.75	0.17
Musicality	124	2.75	0.92	120	2.78	0.80	0.03
Vocal	124	2.86	0.97	120	3.00	0.93	0.14
Appreciation	124	2.93	1.04	120	3.08	1.01	0.14
Instrument	124	2.03	1.16	120	2.50	1.33	0.35
KINAESTHETIC	124	2.98	0.84	120	2.95	0.77	0.03
Physical	124	3.06	0.92	120	3.01	0.93	0.05
Dance	124	2.83	1.28	120	2.83	1.05	0
Hands	124	3.31	1.07	120	3.29	0.98	0.01
MATHS	124	3.10	0.88	120	3.11	0.76	0.01
Problem solving	124	3.07	0.97	120	3.13	0.73	0.06
Calculations	124	3.13	1.05	120	3.10	0.98	0.02
SPATIAL	124	2.91	0.80	120	2.93	0.78	0.02
Artistic	124	2.93	1.13	120	2.85	0.96	0.07
Construction	124	3.00	0.95	120	2.96	0.94	0.04
Imagery	124	2.80	0.84	120	2.99	0.92	0.2
LINGUISTIC	124	2.74	0.83	120	3.04	0.78	0.36*
Sensitivity	124	2.86	1.11	120	3.05	1.00	0.17
Writing	124	2.45	1.05	120	2.93	0.97	0.45**
Reading	124	2.80	1.17	120	3.29	1.00	0.41**
INTERPERSONAL	124	2.86	0.83	120	2.99	0.82	0.15
Interpersonal leadership	124	2.61	0.88	120	2.90	0.93	0.31*
Interpersonal understanding	124	2.84	1.00	120	2.98	0.92	0.14
Interpersonal get along	124	3.21	1.13	120	3.12	0.96	0.07
INTRAPERSONAL	124	2.81	0.82	120	3.06	0.75	0.30*
Intrapersonal self-knowledge	124	2.79	1.07	120	3.05	0.86	0.24*
Intrapersonal feelings	124	2.74	1.15	120	3.03	0.94	0.25*
Intrapersonal relationship	124	2.95	0.91	120	3.05	0.86	0.10
Intrapersonal goals	124	2.79	0.93	120	3.09	0.88	0.32*

NATURALIST	124	3.16	0.90	120	3.23	0.70	0.08
Naturalist animal	124	3.15	1.08	120	3.31	0.80	0.14
Naturalist earth	124	3.17	0.94	120	3.17	0.77	0.12
Technical	124	2.89	0.68	120	2.98	0.69	0.13
Innovative	124	2.78	0.82	120	2.85	0.74	0.08
TOTAL	**124**	**2.91**	**0.66**	**120**	**3.02**	**0.63**	**0.17**

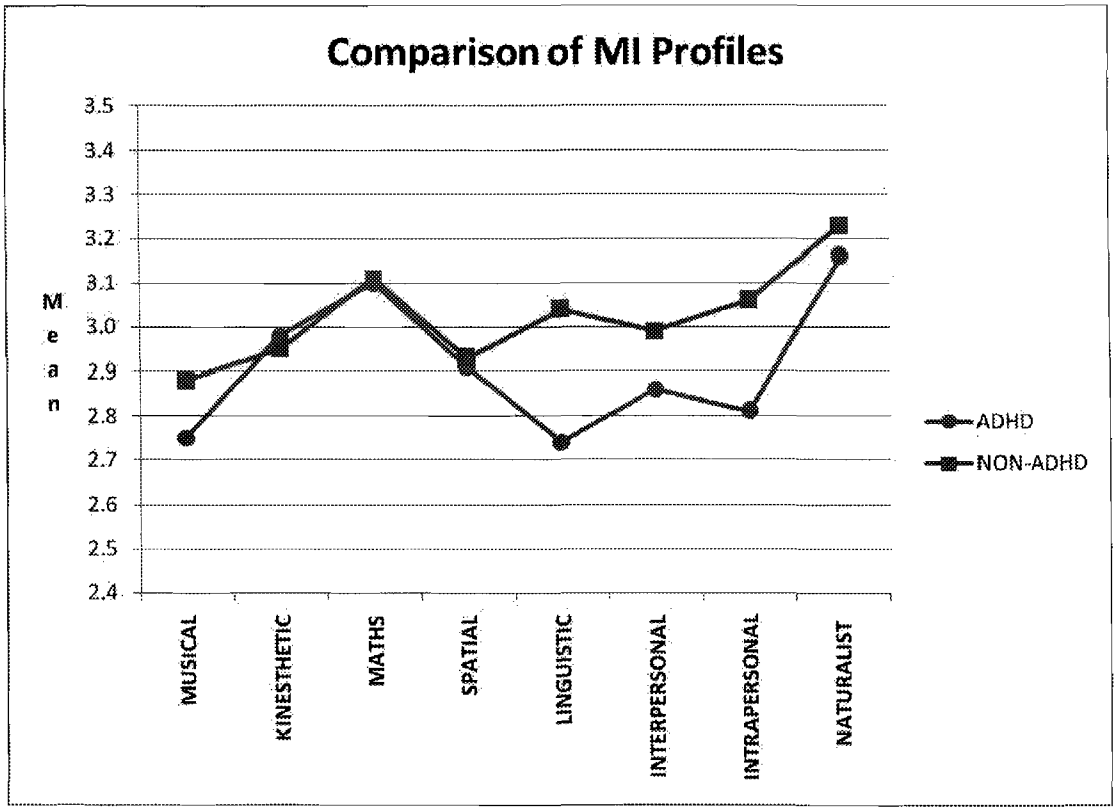
*Small effect

** Medium effect

In the table given above, small and medium effect sizes are observed for some of the scales and subscales. A small to medium effect size (d=0.36) was, for example, obtained for the Linguistic scale. This can be ascribed to the fact that medium effect sizes were obtained for the subscales Writing (d=0.45) and Reading (d=0.41) where it visibly appears that the ADHD participants have rated themselves lower than the non-ADHD participants rated themselves. A small effect size was also obtained for the subscale Interpersonal leadership where the ADHD participants have visibly rated themselves lower than the non-ADHD participants. As far as the Intrapersonal scale is concerned, a small effect size of 0.30 is observed. This can be ascribed to the fact that small effect sizes were obtained for the subscales Intrapersonal self-knowledge (d=0.24), Intrapersonal feelings (d=0.25) and Intrapersonal goals (d=0.32) where it visually appears that the ADHD participants have rated themselves lower than the non-ADHD participants rated themselves.

As far as the other scales and subscales are concerned, the effect sizes indicate that the differences between the means of the ADHD and those of the non-ADHD participants are of no practical significance and that it cannot be deduced that the participants from the two groups have rated themselves differently.

Figure 5.2: Comparison between the MI profiles of ADHD and non-ADHD participants



5.4 Comparison of ranked scores: ADHD vs. Non-ADHD participants

In paragraph 4.4.2.1 it was stated that the MIDAS-KIDS is a *self-report* questionnaire that surveys a wide range of everyday behaviours associated with the different types of intelligence. To gain a better understanding of how the participants from the ADHD and non-ADHD groups have individually rated their intellectual abilities on the eight scales of the MIDAS-KIDS, their scores were ranked. The ranking procedure is explained as follows: A scale score was calculated for each participant (only the mean scale scores were considered). These scores were ranked from high to low for each participant. Hence, if for example a participant obtained the highest score on Musical, Musical would receive a ranking of one. If a participant obtained the lowest score for Mathematics, Mathematics would receive a ranking of eight.

To construct meaningful contingency tables, these ranks were further grouped as follows:

- ranks 1-3 were considered high
- ranks 4-5 were considered neutral
- ranks 6-8 were considered low

These rankings were used to determine whether the ADHD and non-ADHD have rated their intellectual abilities on the various MIDAS-KIDS scales differently. This was done by setting up contingency tables where the grouped ranks (high, neutral, low) of the ADHD and non-ADHD groups were compared.

The dependency in the case of categorical data can be quantified by calculating the effect size *w* as described in section 4.4.2.6. Table 5.3 contains the effect sizes calculated for all the scales:

Table 5.3 Chi-square values and associated effect sizes

Scale	χ^2	Effect size (w)
Musical	3.12	0.11**
Kinaesthetic	5.40	0.14**
Maths	5.34	0.14**
Spatial	2.30	0.09*
Linguistic	11.9	0.22***
Interpersonal	1.53	0.07*
Intrapersonal	16.1	0.25***
Naturalist	2.67	0.10**

* No effect ** Small effect *** Small to medium effect

Table 5.3 illustrates that although no important dependence exists ($w \geq 0,5$) between group (ADHD and non-ADHD) and rating of intellectual ability on the different scales of the MIDAS-KIDS, a visible relationship exists between group and the Linguistic and Intrapersonal scales, since the highest effect sizes (0.25 for Intrapersonal and 0.22 for Linguistic) approximate a medium effect. This means that the frequency distributions of the ratings for the two groups differed visibly on these two scales. The contingency

tables and bar charts for the two highest effect sizes (i.e. Linguistic and Intrapersonal) are presented in Tables 5.4 and 5.5 as well as Figures 5.3 and 5.4 respectively.

Table 5.4: Differences between ADHD group and non-ADHD group in terms of their self-ratings on the Linguistic scale

LINGUISTIC SCALE RANKING				
GROUP		**High**	**Neutral**	**Low**
ADHD	Frequency	29	35	60
	Row percentages	23.4%	28.2%	48.4%
Non- ADHD	Frequency	48	38	34
	Row percentages	40.0%	31.7.%	28.3%

In Table 5.3 above and Figure 5.3 below it can be observed that the non-ADHD group rated their linguistic abilities higher than the ADHD group rated their own. Conversely it can also be seen that the ADHD group rated their linguistic abilities lower than the non-ADHD group rated their own.

Figure 5.3: Differences between ADHD group and non-ADHD group in terms of their self-ratings on the Linguistic scale

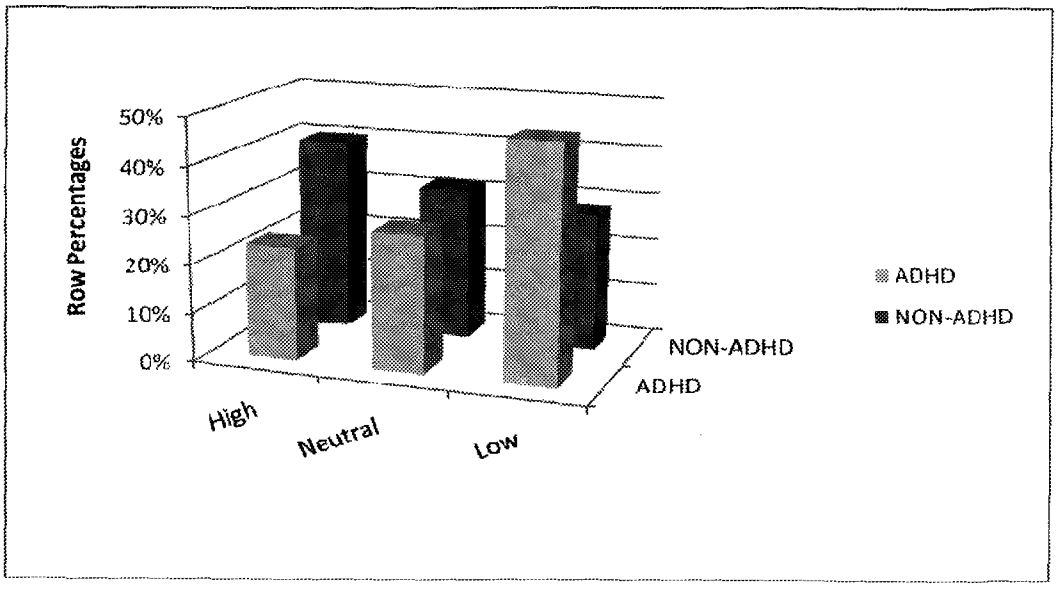
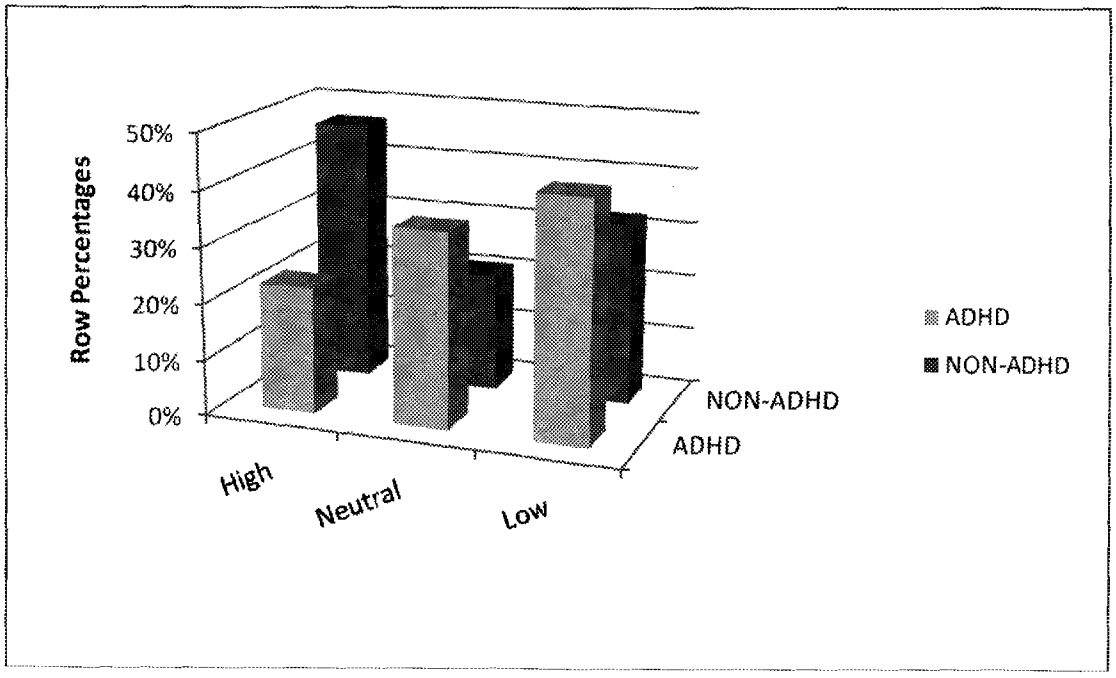


Table 5.5: Differences between the ADHD group and non-ADHD group in terms of their self-ratings on the Intrapersonal scale

INTRAPERSONAL SCALE RANKING				
GROUP		**High**	**Neutral**	**Low**
ADHD	Frequency	28	43	53
	Row percentages	22.6%	34.7%	42.7%
Non-ADHD	Frequency	56	25	39
	Row percentages	46.7%	20.8%	32.5%

In Table 5.5 above and Figure 5.4 below it can be observed that the non-ADHD group rated their intrapersonal abilities higher than the ADHD group rated their own. Conversely it can also be seen that the ADHD group rated their intrapersonal abilities lower than the non-ADHD group rated their own.

Figure 5.4: Differences between ADHD group and non-ADHD group in terms of their self-ratings on the Intrapersonal scale



5.5 Summary of results

The results emanating from the statistical analysis can be summarized as follows:

- The MI profile of the ADHD learners revealed no visible intellectual strengths and weaknesses (see Table 5.1 and Figure 5.1).
- With the exception of Writing and Reading, no differences of real practical significance were observed in the MI profiles of the ADHD and non-ADHD participants (see Table 5.2 and Figure 5.2).
- In terms of self-rating of intellectual ability, no important dependence existed between group (ADHD and non-ADHD) ratings of intellectual ability and the different scales of the MIDAS-KIDS (see Tables 5.4 and 5.5.). However, a visible relationship existed between group ratings and the Linguistic and Intrapersonal scales, where the non-ADHD group rated their abilities higher on the Linguistic and Interpersonal scales than the ADHD group (see Tables 5.4 and 5.5 and Figures 5.3 and 5.4).

5.6 Discussion of results

The results emanating from the empirical investigation will be discussed in the following paragraphs:

5.6.1 MI profile of ADHD learners in terms of their intellectual strengths and weaknesses

As stated in par. 5.5 above, the MI profile of the ADHD learners revealed no noteworthy strengths or weaknesses with regard to the rating of their intellectual abilities on the different scales of the MIDAS-KIDS.

The MIDAS profile is a product of the child's Intrapersonal awareness – and - psychological factors such as depression, ego inflation, low self-esteem and self-criticalness can influence the results (Shearer, 1997:7). While an individual self-report is certainly beneficial in helping to compile intellectual profiles and to diagnose and treat symptoms, its results rely heavily on the accuracy of the individual's perception of his/her psychological and physical status (Rosnow & Rosenthal, 1996:102). According to Shearer (1997:7), it must be noted that the MIDAS-KIDS is a measure of perceived

intellectual disposition and as such the results need to be carefully reviewed and interpreted against the backdrop of collateral information such as the learner's scholastic progress, other psychometric test results, interests and hobbies as well as feedback from teachers and parents.

Despite significant functional problems ADHD learners experienced in multiple areas such as mathematics, language and social relationships, Owens *et al.* (2007:335) found that learners with ADHD provided extremely positive self-reports of their own competence but that these self-reports do not correlate with the results of assessment measures and criteria that assess actual or applied competence. In literature learners with ADHD are often portrayed as individuals with low self-esteem who think poorly of themselves, their abilities and task performance (Edbom *et al.*, 2006:654). A number of studies have been conducted to evaluate the accuracy of these portrayals (Owens *et al.,* 2007:335). The findings of these studies did not support these widely held views, but actually indicated that learners with ADHD display a positive illusory bias (PIB) in their self-perceptions of their competence (Russel, Barkley & Murphy, 2005:150; Owens, 2003; Hoza *et al.*, 2004). Hoza *et al.* (2002) and Evangelista (2008) confirm that PIB has an effect on the self-perception of ADHD learners. The counter-intuitive tendency of ADHD learners to over-rate their abilities/competence is known as *positive illusory bias* (PIB) (Hoza *et al.*, 2002:269). PIB is operationally defined as the disparity that exists between self-reports of competence and actual competence where self-reported competence is substantially higher than the actual manifested competence (Hoza *et al.*, 2002; Owens, 2003).

Hoza *et al.* (2002) found conflicting evidence that although learners with ADHD express low self-evaluations of global self-worth, they tend to over-rate their abilities as far as task-related behaviours are concerned. On task specific self-perceptions, learners with ADHD overestimate their competence (Russel, Barkley & Murphy, 2005:150).

Although children in general tend to overestimate their competence on tasks (viewing themselves as better than average), Russel *et al.* (2005:151) found that learners with ADHD display more limited self-awareness of their deficient areas of competence than non-ADHD learners. The research results of Hoza *et al.* (2002) are consistent with this finding in that the greater disparities between self-perception and actual functioning appeared in those areas where ADHD learners displayed the most impairment.

According to Owens *et al.* (2003:690), regression analysis indicated that positive illusory bias is associated with hyperactivity and impulsivity. Barkley (1994) argued that such a positive illusory bias might be self-protective, allowing learners with ADHD to cope better on a daily basis despite their failure experiences.

5.6.2 Comparison of MI profiles between ADHD and non-ADHD learners in terms of their intellectual strengths and weaknesses

Research conducted by Du Paul *et al.* (2007) and Barkley (2006) indicated that ADHD and non-ADHD learners differ significantly in terms of their academic performance and social behaviour. In the light of these findings one would expect significant differences when the MI profiles of ADHD learners and non-ADHD learners are compared. However, the present study revealed that, with the exception of Writing and Reading, no differences of real practical significance were observed when the MI profiles of the ADHD and non-ADHD participants were compared (see par.5.5).

Barkley (1994) found that up to 50 percent of learners with ADHD experience coexisting learning problems, especially with regard to their linguistic skills (spelling, reading and writing). Similar findings were reported by Bruce, Thernlund and Nettelbladt (2005:55) and Anon (2006:7) who listed problems with communication, reading and writing, maths and social skills as the most prevalent problems ADHD learners experience.

The difficulties ADHD learners display with planning, monitoring and also with phonological and orthographic skills, may be the reason why ADHD learners encounter major challenges when writing (Barkley, 1995; Pedron & Cornoldi, 2007; Re *et al.*, 2008:535). Learners with ADHD often are poor spellers. This can be ascribed to their inattentiveness and their inability to pay attention to detail. They are often not visually aware of patterns in words and they often make careless mistakes in their spelling and writing. As a result of this, their written work often contains numerous erasures and is difficult to read (Anon, 2008).

Re *et al.* (2007:247) confirmed the above findings that, despite demonstrating an adequate standard of general scholastic abilities, ADHD-learners presented with expressive writing difficulties. In general, ADHD-learners produce shorter writing texts that contain a high percentage of spelling errors. These writing and spelling errors can

be ascribed to planning and organizational difficulties as well as reading problems (Barkley, 1995).

ADHD and reading difficulties often co-occur. According to the American Psychiatric Association (1994) and Reiff (2004: 221), approximately 9-45 percent of school-aged ADHD learners exhibit a coexisting specific reading disability.

Learners with ADHD have weak phonemic awareness, finding it difficult to hear the fine distinctions among individual sounds, or phonemes, of the language. ADHD learners often display difficulty recognising letters, single words and common "sight words" or frequently occurring words most readers recognize instantly. They have difficulty learning to "decode," or read words by associating sounds and letters or letter combinations, learning how to spell, occasionally referred to as "encoding". They have difficulty rhyming and breaking words down into individual sounds. ADHD learners need more time than typical readers to put together individual sounds into words (Copeland, 2002; Green & Chee, 1997:46; Reiff, 2004:221).

Because ADHD symptoms typically include inattention, hyperactivity and impulsivity, Rabiner *et al.* (2005) state that significant attention problems can contribute to a learner failing to acquire early reading skills. Bruce (2005:53) confirms that attention difficulties can predict reading achievement.

ADHD learners tend to display anti-social behaviour. Learners' externalizing behaviours interfere with their ability to learn. ADHD learners are usually disruptive in a classroom and pay less attention to the lesson being taught and consequently receive less help from the teacher (Tabbasom & Grainger, 2002: 142). As learners with ADHD become increasingly frustrated, their anti-social behaviour increases, which in turn interferes with the learning process to read. Rabiner *et al.* (2005) support this finding by stating that anti-social behavioural problems can be a response to educational difficulties, especially reading difficulties.

5.6.3 Differences between ADHD and non-ADHD groups in terms of their self-ratings on the MIDAS-KIDS

- In terms of self-rating of intellectual ability, the present study revealed no important dependence between group (ADHD and non-ADHD) ratings of intellectual ability and the different scales of the MIDAS-KIDS. However, a visible relationship

existed between group ratings and the Linguistic and Intrapersonal scales, where the non-ADHD group rated their abilities higher on the Linguistic and Interpersonal scales than the ADHD group rated their own (see par. 5.4). Conversely it can be observed that the ADHD group rated their Linguistic and Intra-personal abilities lower than the non-ADHD group rated their own (Tables 5.4 and 5.5 and Figures 5.3 and 5.4).

Table 5.2 depicts that a medium effect was obtained for the linguistic scale where it visibly appears that the ADHD participants have rated themselves lower than the non-ADHD participants rated their own.

The most prevalent problems ADHD learners experience is with their linguistic skills (Barkley, 1994) (see par. 5.6.2). They have great difficulty with skills such as reading and writing, which consequently affects their scholastic performance and self-image negatively.

A small effect size was deducted for the subscales Intra-personal knowledge, Intra-personal feelings and intra-personal goals. The ADHD participants have visually rated themselves lower than the non-ADHD participants rated themselves (Table 5.2).

Learners with ADHD, especially those with reading difficulties, are more likely to experience a number of negative outcomes such as class retention, peer rejection and lack of popularity (Abikoff *et al*, 2002; Edbom, 2006; Rabiner *et al.*, 2005). They experience frequent academic failure and receive negative feedback from parents, teachers and peers due to their inattention and impulsive actions.

ADHD learners are often rejected, disliked or ignored by their peers due to their difficulties with controlling their aggressive behaviour, understanding others' social signals and them being socially immature (Rabiner *et al.*, 2005). Learners with ADHD are 1-3 years less mature than their peers (American Psychiatric Association, 1994).

The constant rejection, negative feedback from teachers and peers and academic failure can affect their self-concept in a negative manner. Tabbasom and Grainger (2002:142) define self-concept as *"the person's mental image of him/herself and includes ideas, beliefs and attitudes about the self, including thoughts and feelings about one's physical body, intellectual abilities, or worth as a human being."*

from a very young age (Anon, 2006: 1). ADHD learners are prone to harbour negative

Because ADHD learners' relationships with others are volatile, they are often unhappy from a very young age (Anon, 2006: 7). ADHD learners are prone to harbour negative self-views and perceptions of their own abilities, demonstrate lowered self-efficacy, have a significantly lower self-concept than their peers and display inflated self-perceptions. They view future academic achievement as unlikely and give up easily when faced with difficult tasks (Anon, 2006:7; Biederman, 2007; Edbom, 2006; Tabbasom & Grainger, 2002: 150). Due to past failures, Abikoff *et al.* (2002) state that these learners struggle to set realistic and achievable goals for themselves.

Rabiner *et al.* (2005) found that learners who have a negative view of themselves and their skills have a lowered self-esteem and exhibit a higher frequency of aggressive behaviour with a view to enhance their self-image. These learners are also less likely to empathise with others in difficult circumstances. Anon (2006:7) states that this aggressive and withdrawn behaviour, which is characteristic of ADHD learners, is a self-protective reaction to prevent negative feelings which they are prone to most of the time.

5.7 Conclusions

Based on the findings emanating from this research (see par, 5.5) and the above discussion thereof, the following conclusions were drawn:

- The MIDAS-KIDS is a measure of perceived intellectual disposition and because factors such as *positive illusionary bias* (PIB) may cause disparities between ADHD learners' perceived and demonstrated intellectual competence, MI profiles need to be carefully reviewed and interpreted against the backdrop of other diagnostic information when decisions are made with regard to ADHD learners' intellectual strengths and weaknesses.
- Although with the exception of Writing and Reading, no differences of real practical significance were observed in the MI profiles of the ADHD and non-ADHD learners, it is still important that teachers and other professionals take cognizance of MI theory and its application potential for the optimal intellectual development of ADHD and other learners in classrooms.

5.8 Recommendations

In this section recommendations will be made for:

- The development of multiple intelligence in the classroom
- The utilization of the MIDAS-KIDS as a diagnostic instrument
- Further research

5.8.1 Recommendations for developing multiple intelligence in the classroom

The following teaching and assessment strategies are recommended for the development of ADHD and other learners' multiple intelligences in classrooms.

Teaching strategies for developing multiple intelligence

Armstrong (2000:51) states that it is essential for all teachers to become familiar with the eight basic intelligences to facilitate their intellectual growth. He suggests that the following teaching strategies should be implemented in classrooms to develop learners' multiple intelligences (Armstrong, 2000: 51-66):

- **Strategies for developing Linguistic intelligence**

  Storytelling. When using storytelling in the classroom, the teacher should weave all the essential concepts, facts, ideas and teaching goals of a particular lesson into the story. This strategy captures the learners' attention and stimulates their imagination.

  Brainstorming. During a brainstorming session learners produce a torrent of verbal thoughts that can be collected and put on the chalk board or on an overhead transparency. This strategy acknowledges and stimulates learners' creative thoughts.

  Tape recordings. The tape recorder is a valuable learning tool in any classroom. It offers learners the opportunity to listen to their verbal expressions and helps them to improve their verbal skills of communication, problem solving and the

expression of their inner feelings. Learners who are not good writers can also record their thoughts on tape as an alternative mode of verbal expression.

Journal writing. Journal writing and journal keeping help learners to jot down their personal thoughts about specific topics. Topics can be broad and open-ended, such as: "*Write about anything you're thinking about or feeling during the class day*" or specific: "*How do you feel about cruelty to animals?*" Journal entries can be private, shared only between teacher and learner, or it can be voluntarily read to the rest of the class.

- **Strategies for developing Logical-mathematical intelligence**

Calculations and quantifications. Teachers introduce learners to numbers and mathematical concepts both inside and outside the mathematics and science learning areas. In learning areas such as Social Sciences and Life Orientation, teachers should focus on important statistics regularly, e.g. lives lost in road accidents, natural disasters or epidemics and population numbers. For example, "*How many people died of Cholera in Zimbabwe during 2008?*" Teachers must be alert to interesting statistics and intriguing maths problems which would appeal to the life-world of learners. Integrating mathematical concepts and calculations into nonmathematical subjects will develop analytical and logical thinking and will demonstrate to learners that mathematics is relevant to all life situations.

Classifications and Categorizations. Learners' logical minds can be stimulated if information is put into some kind of rational framework. Examples of frameworks include time lines, attribute webs, 5W organizers (who, what, when, where and why) and mind maps. Most of these frameworks are also spatial by nature. The value of this approach is that disparate fragments of information can be organized around central ideas or themes, making them easier to remember, discuss and think about.

Socratic Questioning. In Socratic questioning, the teacher serves as the questioner of learners' points of view. Instead of talking *at* learners, the teacher participates in dialogues *with* them, aiming to uncover the accuracy of their beliefs. The teacher guides the *testing of ideas* for clarity, precision, accuracy, logical coherence, or relevance through artful questioning. The purpose is not to humiliate learners or put them in the wrong, but rather to help them sharpen their own

critical thinking skills so that they no longer base their opinions on misconceptions, half-truths, generalizations, stereotypes or on their emotions and irrational beliefs.

- **Strategies for developing Spatial intelligence**

Visualization. One of the easiest ways of helping learners translate written reading material into visual images is by having them close their eyes and visualizing whatever is being read or studied. One application of this strategy involves having learners create their own *inner blackboards* in their minds. They can place on their mental black boards any material they need to remember: spelling words, mathematical formulas, science facts or other data. A more open-ended application of this strategy involves having learners close their eyes and seeing pictures of what they've just read or studied. Afterwards they can draw or talk about their experiences.

Colour cues. There are many creative ways of colour in the classroom as a learning tool. Use a variety of colours of chalk, markers and transparencies when writing in front of the class. Provide learners with coloured pencils and pens and coloured paper on which to write assignments. Learners can learn to use differently coloured markers to colour code facts. Teachers should use colours to emphasize patterns, rules or classifications during their teaching. Learners can also use their favourite colours as stress reducers when coping with difficult problems or facts, e.g. "*If you don't understand something, imagine your favourite colour filling your head. This can help you find the right answer or clarify things for yourself.*"

Idea sketching. Teachers should recognize and utilize the value of visual thinking. It helps learners to articulate their understanding of subject content. Idea sketching implies that learners should draw key points, main ideas, central themes or core concepts being taught. Neatness and realism should be de-emphasized in favour of quick sketches that will help learners to articulate an idea. This strategy can be used to evaluate a learner's understanding of an idea, to emphasize a concept or to offer learners the opportunity to explore ideas in greater depth.

Graphic symbols. This strategy involves drawing pictures. Teachers who can support their teaching with drawings and graphic symbols as well as with words will reach a wider range of learners. The teacher does not need to have superior

drawing skills to use this strategy; roughly drawn graphic symbols will suffice in most cases. The teacher's willingness to model imperfect drawing can actually serve as an example to learners who feel uncomfortable about sharing their own drawings with the class.

- **Strategies for developing Bodily-Kinaesthetic intelligence**

Body answers. Learners respond to what they have been taught by using their bodies as a medium of expression. The simplest and most used example of this strategy is asking learners to raise their hands to indicate understanding. Instead of raising hands, the learner could also smile, blink one eye, hold up fingers, make flying motions with their arms and so forth. Learners can provide *body answers* during a lecture, e.g. "*If you don't understand what I've just said, put your finger on your temple; if you don't understand, scratch your head*"

Classroom Theatre. To bring out the actor in each of the learners, ask them to enact the text, problems or other material to be learned by dramatizing or role playing the content. Classroom theatre can be as informal as a one-minute improvisation of a reading passage during class or as formal as a one-hour play at the end of the quarter. It can be done without any materials or it may involve substantial use of props. Learners can act themselves or use puppets.

Hands-on Thinking. Learners should be given opportunities to learn by manipulating objects or by making things with their hands, for example, learners can learn new words by forming them in clay, or learners can express complex concepts by creating clay or wooden sculptures, collages or other assemblages.

Body maps. The human body can be used as convenient educational tool when transformed into a reference point or map for specific learning areas. One of the most common examples of this approach is the use of fingers in counting and calculating. Teachers can utilize the body when teaching learners in other learning areas as well. For example, in Social Science the body might represent Africa. The teacher can ask learners the following question" "If your feet represent South Africa, where would Egypt be?". By performing physical movements representing a specific process or idea, learners can gradually internalize the process or idea.

- **Strategies for developing Musical intelligence**

Rhythms, songs, raps and chants. The teacher can take the essence of whatever is being taught and put it into a rhythmic format that can be sung, rapped or chanted, for instance singing the times tables to a popular song. Inviting learners themselves to create songs, raps or chants that summarize, synthesize or apply meaning to whatever they are learning can help learners move to higher levels of learning. This strategy can also be enhanced through the addition of percussion or other musical instruments.

Discographies. Teachers could supplement their teaching with recorded musical selections – tapes, compact discs and records – that illustrate, embody or amplify the content of what they are teaching, for example, when teaching a lesson about Africa and its animals, the teacher could play music from The Lion King.

Super memory music. Teaching and learning with background music can facilitate the learning process (Armstrong, 2000:59). Baroque and classical musical selections seem to be particularly effective. Learners should listen to the teacher in a relaxed state, e.g. lying with their heads on their desks while the background music is playing.

Mood music. Teachers could use recorded music that creates an appropriate mood or emotional atmosphere for a particular lesson or part of it. Such music includes sound effects, nature sounds or classical or contemporary pieces that facilitate specific emotional states, for instance just before learners are about to read a story that takes place near the sea, a recording of sea sounds can be played.

- **Strategies for developing Interpersonal intelligence**

Peer sharing. Sharing is perhaps the easiest of the MI strategies to implement in the classroom. The beginning of a lesson could start with the instruction: "*Turn to a person near you and share what you know about* _____." The blank space can be filled with virtually any topic. This instruction will help learners unlock pre-existing knowledge concerning the lesson topic under discussion. The teacher can also implement a "*buddy system*" so that a learner will always share information with the same *buddy*. The teacher can also appoint new *buddies* so

that, by the end of the year, each learner has formed a sharing friendship with every learner in the classroom. Sharing periods can be brief (one minute) or extended (up to one hour). Peer sharing can also evolve into peer tutoring.

People sculpture. When learners are studying the skeletal system they can build a people structure of a skeleton in which each learner represents a bone or group of bones. In Mathematics people structures of different equations can be created where each learner would represent either a number or a function of the equation. This strategy helps learners to physically represent things that were formerly represented only in text books, overhead transparencies or lectures.

Cooperative groups. The use of small groups working towards common learning outcomes is an essential component of the cooperative learning model. Such groups probably work most effectively when they have three to eight members. Learners in cooperative groups can tackle a learning assignment in a variety of ways. The group may work collectively on a written assignment where, for example, each member will contribute ideas and/or where responsibilities are shared. Cooperative groups provide learners with the opportunity to operate as a social unit – an important prerequisite for successful functioning in real-life work environments.

Board games. Board games are a fun way for learners to learn in the context of an informal social setting. At one level, learners are chatting, discussing rules, throwing dice and laughing. At another level, they are engaged in learning information or skills that happen to be the focus of the game.

Simulations. A simulation involves a group of learners coming together to create an "as – if" environment, for instance learners studying a particular historical period might actually dress up in costumes of that period, turning the classroom into a place resembling the period, and begin acting as if they were living in that era. Simulations can be quick and improvisational by nature, with the teacher providing an instant scenario to act out. Through conversation and other interactions, learners begin to gain an insider's view of the topic they are studying.

- **Strategies for developing Intrapersonal intelligence**

One-minute reflection periods. During lectures, discussions, project work or other activities, learners should be given frequent "*time outs*" for introspection or deep thinking. One-minute reflection periods offer learners time to digest the information presented or to connect it to something they experience in their own lives. "Time outs" also provide a refreshing change of pace that helps learners to stay alert and ready for the next activity. A one-minute reflection period can occur any time during the school day, but it may be particularly useful after the presentation of information that is especially challenging.

Personal connections. Learners often ask "*What does this all have to do with my life*?" It's up to the teacher to help answer this question by continually making connections between what is being taught and the lives of their learners. This strategy involves weaving learner's personal associations, feelings and experiences into the teacher's teaching, for example questions such as "*How many of you have ever ...?*", or requests such as: "*I'd like you to think back in your life to a time when* ...", will help learners to relate new information to their pre-existing knowledge and life-worlds.

Choice time. Giving learners the opportunity to choose is as much a fundamental principle of good teaching as it is a specific intrapersonal teaching strategy. Choice time implies that opportunities should be given to learners to make decisions concerning their learning experiences. These choices may be limited and small, or they may be more significant and large, for example, learners can select the kind of project they want to work on, topic they would like to explore or method of presenting the final project.

Feeling-toned moments. To feed the emotional brain, teachers need to teach with feeling. This strategy implies that teachers are responsible for creating moments during their teaching where learners can laugh, feel angry, express strong opinions, get excited about a topic or experience a wide range of other emotions. Teachers can help to create feeling-toned moments in a number of ways: by modelling these emotions while you teach; by making it safe for learners to experience and express feelings in the classroom and by providing experiences such as books, movies that evoke feeling-toned reactions.

Goal-setting sessions. One of the outstanding characteristics of highly developed intrapersonal learners is their ability to set realistic goals for themselves. Educators help learners immeasurably in their preparation for life when they provide opportunities for goal setting. These goals may be short term, for example: "*I would like you to list three things you would like to learn today*" or long term, "*Tell me what you see yourself doing ten years from now*". These can be academic or life goals.

- **Strategies for developing Naturalist intelligence**

Nature walks. Teachers should consider the benefits of a walk in the woods, veld, or even on the school grounds as a way of reinforcing what has been learnt inside the classroom. Virtually any subject lends itself to a nature walk, for example growing of plants, the weather, the elements and animals. Nature walks also helps learners to prepare for creative writings, drawings or other art-oriented activities.

Windows onto learning. One of the classic images of an inattentive learner in the classroom is of a child sitting at a desk looking out the window. Often learners find what is happening outside the classroom much more interesting than that which is happening inside the classroom. *Looking out the window* is a technique that teachers can use to teach some of the learning areas in a more interesting way, for example, teachers can ask learners to investigate the cost of planting trees just outside the window or when a lesson on tornado's is given to ask learners to look out the window and imagine what they would see how it would feel when a tornado is approaching the school.

Plants as props. If teachers cannot take learners on nature walks, nature should be brought to the classroom. There is a practical advantage of using plants as a learning tool. Plants can make useful props as background scenery for the classroom theatre and people structures. When teaching about the branches of government, the teacher can use a nearby branching plant as a naturalistic metaphor to illustrate the concept. Assigning a particularly difficult child with a naturalistic interest, the job of taking care of a plant in the classroom can be a constructive way of redirecting excessive energy.

Pet in the classroom. This strategy underlines how important animals could be to enhance teaching. First, having a pet in the classroom creates for naturalistically inclined learners a safe place in the classroom where they can have a relationship with the natural world and experience a sense of caring for nature. Second, having a pet in the classroom has many specific instructional uses. Learners can develop the scientific skill of observation by keeping notes on the pet's behaviour, keeping record of their pet's food intake, weight gains and other vital statistics. Animals that have proven to be very good classroom pets are rabbits, fishes, hamsters and small birds.

5.8.1.1 Assessment strategies for developing multiple intelligence

MI theory suggests that any teaching objective can be taught in at least eight different ways and it also implies that any objective can be assessed in at least eight different ways (Armstrong, 2000:93; Hoerr, 2000). The following authentic activities can be used by teachers to assess learner development effectively (Bellanca, Chapman & Swartz, 1994; Schwert, 2004).

- *Journals/logs.* When learners write down their thoughts and actions in journals or logs, it enables them to look back at past entries to make connections and to apply their ideas, for example, learners critique their own work once a project is completed.
- *Performance.* Learners share their knowledge with various audiences by taking part in a show, for example when a play about the negative effects of drug abuse is performed.
- *Demonstrations.* Learners demonstrate to others how things should be done, for example in physical education, a learner demonstrates to the rest of the class how a particular warm-up exercise should be done.
- *Products.* Learners produce objects on the basis of what they have learnt, for example building a solar stove from waste materials.
- *Graphic organizers.* Learners use visual formats to gather, analyze and evaluate material, for example bar graphs are used to plot daily maximum and minimum temperatures, or a concept map is created to demonstrate a scientific principle.

- *Projects.* Learners take part in meaningful long-term projects that incorporate several intelligences, for example, learners take part in an anti-pollution project and present it at a science fair.
- *Exhibits.* Learners research various topics and present posters of what they have learnt/found at open days.

When these activities are performed, teachers can assess learners' levels of competence by using a variety of tools such as rubrics, interview schedules, observation checklists and formal assessments (written tests or examinations).

The following table provides a summary of teaching and assessment activities and materials that can be used for developing the different intelligences (Armstrong, 2000:41; Hoerr, 2000; Schwert, 2004:31):

Table 5.6: A summary of teaching and assessment activities and materials that can be utilized for developing multiple intelligence in the classroom

INTELLIGENCE	TEACHING ACTIVITIES	ASSESSMENT ACTIVITIES	MATERIALS/ TOOLS
Linguistic	▪ Storytelling ▪ Brainstorming ▪ Tape recording ▪ Journal writing ▪ Needs to read, see and hear words. ▪ Poetry ▪ Nursery rhymes	▪ Journal writing - write a response on the books you have read. ▪ Written descriptions of investigations ▪ Audiotapes of debates, discussions, problem solving processes ▪ Reading skills checklists ▪ Audiotapes of reading or storytelling ▪ Make a tape recording of your thoughts about the subject ▪ Conduct an interview with a friend and ask the most important questions on the subject	▪ Books ▪ Card or board games ▪ Tape recorders ▪ Props for storytelling ▪ Movies ▪ Worksheets ▪ Computer games

Musical	▪ Rhythms, songs, raps and chants ▪ Discographies ▪ Super memory music ▪ Mood music ▪ Musical chairs ▪ Listening to music ▪ Dancing	▪ Create a song, rap or rhymes ▪ Compositions ▪ Collages	▪ Musical instruments ▪ Various types of music ▪ Karaoke ▪ Animal sounds
Logical-mathematical	▪ Calculations and quantifications ▪ Classifications and categorizations ▪ Socratic questioning ▪ Scientific experiments	▪ Develop a hypothesis ▪ Maths skills checklist	▪ Puzzles ▪ Blocks ▪ Stacking toys ▪ Board games ▪ Calculators
Spatial	▪ Visualization ▪ Colour cues ▪ Idea sketching ▪ Graphic symbols ▪ Drawing ▪ Painting ▪ Sculpture ▪ Block play	▪ Draw a picture ▪ Drawing of diagrams, flow charts, sketches or mind-maps of thinking ▪ Make a video	▪ Puzzles ▪ Blocks (all kinds) ▪ Drawing materials ▪ Painting ▪ Clay ▪ Chalkboards. ▪ Movies ▪ Television ▪ LEGO ® sets
Bodily-kinaesthetic	▪ Body answers ▪ Classroom theatre ▪ Body map ▪ Hands-on thinking (make things with their own hands) ▪ Ball games ▪ Climbing ▪ Physical illustrations	▪ Build a model ▪ Performance ▪ Demonstrations	▪ Bean bags ▪ Swings ▪ Balls ▪ Bikes ▪ Climbing materials ▪ Water
Interpersonal	▪ Peer sharing ▪ People sculpture ▪ Cooperative groups ▪ Simulations ▪ Board games ▪ Role playing ▪ Cooperative learning	▪ Share with a friend ▪ Write a letter to someone ▪ Give a group report	▪ Toy telephones ▪ Hand puppets ▪ Dress-up clothes ▪ Dolls ▪ Thematic materials
Intrapersonal	▪ One-minute reflection periods ▪ Personal connections ▪ Choice time ▪ Feeling-toned moments ▪ Goal-setting sessions ▪ Role playing	▪ Design your own response ▪ Give a journal entry ▪ Self-assessment of work ▪ Notes on self-reflection on work	▪ Mirrors ▪ Puppets ▪ Dress up clothes
Naturalist	▪ Nature walks ▪ Windows into learning ▪ Plants as props ▪ Field trips ▪ Planting seeds ▪ Taking care of pets in the classroom ▪ Gardening	▪ Do an ecological project ▪ Videotape of demonstration of naturalist project ▪ Photos of nature collections	▪ Sand ▪ Water ▪ Farm toys ▪ Wood ▪ Toy animals ▪ Pets in class ▪ Binoculars ▪ Pet care materials

5.8.2 Recommendations for utilizing the MIDAS-KIDS as a diagnostic instrument

When teachers and other professionals attempt to determine the MI profiles of learners, the MIDAS-KIDS should not be used as the sole diagnostic instrument. The reason for this lies in the fact that the MIDAS-KIDS is a measure of perceived intellectual disposition and it relies heavily on the accuracy of learners' perceptions about their competence in the different intellectual domains. Thus results obtained from the MIDAS-KIDS need to be carefully reviewed and interpreted against the backdrop of collateral information such as learners' demonstrated scholastic abilities, psychometric test results obtained from individual intelligence tests, aptitude tests and interest questionnaires as well as information gained from learner, teacher and parent interviews. This will enable teachers and other professionals to create a more accurate and holistic profile of a learner's multiple intelligence.

5.8.3 Recommendations for further research

This study focused on the MI profiles of ADHD and non-ADHD learners from a particular study population. Thus the results emanating from the research are only applicable to the participants from this particular study population and cannot be generalized to the South African population of ADHD and non-ADHD learners. Hence the study should be replicated involving a national sample of ADHD and non-ADHD learners.

A mixed method approach, in which quantitative and qualitative data collection methods and analyses are used to determine the MI profiles of the participants, would have helped to create more accurate and holistic MI profiles and should be used in future research.

5.9 Concluding remarks

The aims of this research were to determine what the MI profile of ADHD learners reveal in terms of their intellectual strengths and weaknesses and to determine whether significant differences exist between the MI profiles of ADHD and non-ADHD learners. The MI profile of the ADHD learners revealed no visible intellectual strengths and weaknesses. With the exception of Writing and Reading, no differences of real practical

significance were observed when the MI profiles of the ADHD and non-ADHD participants were compared.

It was concluded that because the MIDAS-KIDS is a measure of perceived intellectual disposition and factors such as *positive illusory bias* (PIB) may cause disparities between ADHD learners' perceived and demonstrated intellectual competence, MI profiles obtained from the MIDAS-KIDS need to be carefully reviewed and interpreted against the backdrop of other diagnostic information.

In spite of the findings emanating from this research, MI theory offers a model that can help teachers to gain a better understanding of the unique range of intellectual abilities and potential of their learners. Furthermore, MI theory opens the gate to a broad range of didactic activities that can assist teachers in developing neglected intelligences, activating underdeveloped intelligences and elevating well-developed intelligences to even higher levels of proficiency.

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APPENDIX 1
ENGLISH AND AFRIKAANS MIDAS QUESTIONNAIRES

==========

MIDAS-KIDS

"All About Me"

==========

C. Branton Shearer, Ph.D.

INSTRUCTIONS

Please read!

It takes approximately 25 minutes to answer these questions. Eight (8) fields of activity, skills and interests are covered. Think about this as an interview with yourself. You might be surprised by what your know about yourself when you think carefully.

Where questions provide a few options, choose the one activity in which you are strongest and only judge yourself on that activity.

You don't have to have an answer to every question or guess because each question provides the possibility of answering: "I don't know" or "Not applicable". Use this answer in cases where it suits you best. For example, some questions might deal with activities that you might not remember or that you have never completed.

EXAMPLE:

1. **Can you hold a tune? If "2" is your choice, colour in the relevant "block":**

1.	A little bit.	1
2.	Reasonably.	X
3.	Well.	3
4.	Very well.	4
5.	Excellent.	5
6.	I don't know.	6

- Only colour one "block" for each question **with a pencil.**
- Please do not write on the questionnaire.
- Erase all changes thoroughly.

It is important that you respond *honestly.*

Be fair towards yourself.

It is in order to say that you don't know.

Name and surname: _____

Gender	Male	1
	Female	2

Grade	4	5	6	7

Age	9 years	1
	10 years	2
	11 years	3
	12 years	4
	13 years	5
	14 years	6

Name of school: _____

1. MUSICALITY

Did you ever learn to play an instrument of take music lessons?

1. Once or twice	1
2. Maybe three or four times	2
3. For a few months	3
4. Less than a year	4
5. More than a year	5
6. I never had the opportunity	6

How well can you sing?

1. Not very well	1
2. Reasonably well	2
3. Well	3
4. Very well	4
5. The best	5
6. I don't know	6

Do you think that you can be a really good musician or singer if you should try?

1. I don't think so, probable not	1
2. Maybe a little bit	2
3. I might be reasonble good	3
4. I would have been a good musician	4
5. I would have been an especially good musician	5
6. I don't know	6

Do you often create songs as you go just for the fun of it, like when you play for instance?

1. I never do it	1
2. I have once or twice	2
3. I sometimes do it	3
4. I often make up new songs	4
5. I continuously make up new songs	5
6. I don't know	6

2. KINAESTHETIC

How well can you run, jump, hop, skip or gallop?

1. Reasonably well	1
2. Well	2
3. Very well	3
4. Excellent	4
5. The best	5
6. I don't know	6

How well can you use your hands to play the jackpot, mix cards or perform trickery?

1. Not very well	1
2. Reasonably well	2
3. Well	3
4. Very well	4
5. The best	5
6. I don't know	6

How well can you dance or move on time?

1. Not very well	1
2. Reasonably	2
3. Well	3
4. Very well	4
5. Excellent	5
6. I don't know	6

3. MATHEMATICS/LOGIC

When you were young, how easy did you learn numbers and counting?

1. I was difficult	1
2. It was reasonably easy	2
3. It was easy	3
4. It was very easy	4
5. I learned much faster than other children	5
6. I don't know	6

Do you like science, to solve problems, to measure things and to do experiments?

1. Not really	1
2. Maybe a little	2
3. About average	3
4. More than most children	4
5. More than anyone else that I know	5
6. I don't know	6

4. SPATIAL

Do you like decorating your room with pictures, posters, drawings and so forth?

1. Not very much	1
2. Sometimes	2
3. Often	3
4. Virtually all the time	4
5. All the time	5
6. I don't know, or I have never had the opportunity	6

How good are you at taking things apart and then putting them back together again? For instance models, toys, building sets or puzzles.

1. Not very good	1
2. Reasonable good	2
3. Good	3
4. Excellent	4
5. The best	5
6. I don't know	6

Do you like inventing cards, crafts, clothes or inventions?

1. Not very often	1
2. Sometimes	2
3. Often	3
4. Virtually all the time	4
5. All the time	5
6. I don't know	6

5. LINGUISTIC

How well do you memorise poems, songs or rhymes?

1. Not very well, or reasonable well	1
2. Well	2
3. Very well	3
4. Excellent	4
5. The best	5
6. I don't know	6

How difficult was it for you to learn the alphabet or to learn to read?

1. It was difficult	1
2. It was reasonably easy	2
3. It was easy	3
4. It was very easy	4
5. I learned quicker than the other children	5
6. I don't know	6

How well can you write a note or a letter to someone?

1. Not very well	1
2. Reasonably well	2
3. Well	3
4. Very well	4
5. Excellent	5
6. I don't know	6

6. INTERPERSONAL

How well can you help other people solve conflict, like for instance two friends?

1. Not very well	1
2. Reasonably well	2
3. Well	3
4. Very well	4
5. Excellent	5
6. I don't know	6

Do you ever try very hard to understand the feelings of other people?

1. Now and then	1
2. Sometimes	2
3. Often	3
4. Most of the time	4
5. All the time	5
6. I don't know	6

How easy is it for you to make a new friend?

1. It can be difficult	1
2. It is sometimes easy	2
3. It is often easy	3
4. It is easy most of the time	4
5. It is always easy	5
6. I don't know	6

7. INTRAPERSONAL

Do you like working on creative writing projects?

1. Not at all	1
2. A little	2
3. Sometimes	3
4. Very much	4
5. It's my favourite	5
6. I don't know, or I have never done it	6

Is it difficult for you to control your emotions and temper?

1. It can be very difficult	1
2. It is often difficult	2
3. It is sometimes difficult	3
4. It is often easy	4
5. It is always easy	5
6. I don't know	6

Do you ever offer to help someone in your home or at school?

1. Now and then	1
2. Sometimes	2
3. Often	3
4. Virtually all the time	4
5. All the time	5
6. I don't know	6

Is it easy for you to switch from one activity to the next when you have to?

1. Most of the time it is difficult	1
2. It is sometimes difficult	2
3. It is often easy	3
4. It is virtually always easy	4
5. It is always easy	5
6. I don't know	6

8. NATURALIST

Have you ever raised a pet or other animals?

1. Never, or seldom	1
2. A bit, once	2
3. Sometimes	3
4. Often	4
5. All the time	5
6. I don't know	6

Are you ever curious about nature and do you ever search for animals in the bush, collect plants, insects or other things?

1. Never, or seldom	1
2. Now and then	2
3. Sometimes	3
4. Often	4
5. Virtually all the time	5
6. I don't know	6

AFRIKAANS: SELFRAPPORTERINGSVRAELYS

==========

MIDAS-KINDERS

"Alles Oor Myself"

==========

C. Branton Shearer, Ph.D.

INSTRUKSIES

Lees asseblief!

Dit neem ongeveer 25 minute om hierdie vrae te beantwoord. Agt (8) aktiwiteits-, vaardigheids- en belangstellingsvelde word gedek. Dink hieraan asof jy 'n onderhoud met jouself voer. Jy sal dalk verras wees oor wat jy van jouself weet wanneer jy versigtig dink.

Vir vrae wat jou 'n paar keuses gee, moet jy die een aktiwiteit kies waarin jy die sterkste is en takseer jouself net op daardie aktiwiteit.

Jy hoef nie by elke vraag te antwoord of te raai nie, want elkeen het die moontlike keuses: "**Ek weet nie** of **Nie van toepassing nie**". Gebruik telkens hierdie antwoord wanneer dit vir jou die beste pas. Byvoorbeeld, sommige vrae kan dalk vra na aktiwiteite wat jy dalk nie onthou nie, of wat jy nog nooit uitgevoer het nie.

VOORBEELD:

1. Kan jy "op die wysie" sing? Indien **"2"** jou keuse is, maak 'n **kruis** oor die blokkie in:

1. 'n Klein bietjie	1
2. Redelik	X
3. Goed.	3
4. Baie goed	4
5. Uitstekend	5
6. Ek weet nie.	6

- Maak net een **kruis** by elke vraag met 'n grys potlood
- Moet asseblief nie op die vraelys **skryf nie**.
- Vee alle veranderinge **deeglik** uit.

Naam en van: _____

Geslag	Seun	1
	Dogter	2

Graad	4	5	6	7

Ouderdom	9 jaar	1
	10 jaar	2
	11 jaar	3
	12 jaar	4
	13 jaar	5
	14 jaar	6

Naam van skool: _____

1. MUSIKAAL

Dink jy dat jy 'n werklik goeie musikus of sanger kan wees as jy sou probeer?

1. Ek dink nie so nie, waarskynlik nie	1
2. Dalk 'n klein bietjie	2
3. Ek sou redelik goed kon wees	3
4. Ek sou 'n goeie musikus kon wees	4
5. Ek sou 'n besondere musikus kon wees	5
6. Ek weet nie	6

Hoe goed kan jy sing?

1. Nie baie goed nie	1
2. Redelik goed	2
3. Goed	3
4. Baie goed	4
5. Die beste	5
6. Ek weet nie	6

Het jy ooit geleer om 'n instrument te bespeel of musieklesse geneem?

1. Een of twee maal	1
2. Miskien drie of vier maal	2
3. 'n Paar maande lank	3
4. Minder as 'n jaar	4
5. Langer as 'n jaar	5
6. Ek het nooit die geleentheid gehad nie	6

2. KINESTETIES

Hoe goed kan jy hardloop, spring, huppel, hop of galop?

1. Redelik goed	1
2. Goed	2
3. Baie goed	3
4. Uitstekend	4
5. Die beste	5
6. Ek weet nie	6

Hoe goed kan jy dans of op maat beweeg?

1. Nie baie goed nie	1
2. Redelik	2
3. Goed	3
4. Baie goed	4
5. Uitstekend	5
6. Ek weet nie	6

Hoe goed gebruik jy jou hande om boerpot te speel, vir kaarte skommel, tower-kunsgrepies of goëlery?

1. Nie baie goed nie	1
2. Betreklik	2
3. Goed	3
4. Baie goed	4
5. Die beste	5
6. Ek weet nie	6

3. WISKUNDE/LOGIKA

Hou jy van wetenskap, om probleme op te los, om dinge te meet en eksperimente te doen?

1. Nie regtig nie	1
2. Dalk 'n bietjie	2
3. Omtrent gemiddeld	3
4. Meer as die meeste kinders	4
5. Meer as enigiemand anders wat ek ken	5
6. Ek weet nie	6

Toe jy jonk was; hoe maklik het jy jou getalle geleer en om te tel?

1. Dit was moeilik	1
2. Dit was redelik maklik	2
3. Dit was maklik	3
4. Dit was baie maklik	4
5. Ek het baie vinniger as ander kinders geleer	5
6. Ek weet nie	6

4. RUIMTELIK

Hou jy daarvan om jou kamer met prente of plakkate, tekeninge en so meer te versier?

1. Nie baie nie	1
2. Soms	2
3. Dikwels	3
4. Feitlik die hele tyd	4
5. Die hele tyd	5
6. Ek weet nie, of ek het nog nie die geleentheid gehad nie	6

Hoe goed is jy daarmee om dinge uitmekaar te haal en dit dan weer aanmekaar te sit? Byvoorbeeld modelle, speelgoed, bou-stelle of legkaarte.

1. Nie baie goed nie	1
2. Redelik goed	2
3. Goed	3
4. Uitstekend	4
5. Die beste	5
6. Ek weet nie	6

Hou jy daarvan op ontwerpe vir kaartjies, handwerk, klere of uitvindsels uit te dink?

1. Nie baie dikwels nie	1
2. Soms	2
3. Dikwels	3
4. Feitlik die hele tyd	4
5. Die hele tyd	5
6. Ek weet nie	6

5. TAALKUNDIG

Hoe goed leer jy gedigte, liedjies of rympies uit jou kop?

1. Nie baie goed nie, of redelik goed	1
2. Goed	2
3. Baie goed	3
4. Uitstekend	4
5. Die beste	5
6. Ek weet nie	6

Hoe goed kan jy 'n nota of brief aan iemand skryf?

1. Nie baie goed nie	1
2. Redelik goed	2
3. Goed	3
4. Baie goed	4
5. Uitstekend	5
6. Ek weet nie	6

6. INTERPERSOONLIK

Hoe goed kan jy ander mense help om 'n meningsverskil op te los, soos tussen twee vriende?

1. Nie baie goed nie	1
2. Redelik goed	2
3. Goed	3
4. Baie goed	4
5. Uitstekend	5
6. Ek weet nie	6

Probeer jy ooit baie hard om die gevoelens van ander mense te verstaan?

1. So af en toe	1
2. Soms	2
3. Dikwels	3
4. Die meeste van die tyd	4
5. Die hele tyd	5
6. Ek weet nie	6

Hoe maklik is dit vir jou om 'n nuwe vriend te maak

1. Dit kan moeilik wees	1
2. Soms is dit maklik	2
3. Dikwels is dit maklik	3
4. Die meeste van die tyd is dit maklik	4
5. Dit is die hele tyd maklik	5
6. Ek weet nie	6

7. INTRAPERSOONLIK

Geniet jy dit om aan skryfprojekte te werk?

1. Geensins nie	1
2. 'n Bietjie	2
3. Soms	3
4. Baie	4
5. Sommer baie	5
6. Ek weet nie, of ek het dit nog nie gedoen nie	6

Is dit vir jou moeilik om jou gevoelens en humeur te beteuel?

1. Dit kan baie moeilik wees	1
2. Dit is dikwels moeilik	2
3. Dit is soms moeilik	3
4. Dit is dikwels maklik	4
5. Dit is altyd maklik	5
6. Ek weet nie	6

Bied jy ooit aan om iemand in die huis of in die skool te help?

1. So af en toe	1
2. Soms	2
3. Dikwels	3
4. Feitlik die hele tyd	4
5. Die hele tyd	5
6. Ek weet nie	6

Is dit vir jou maklik om van een aktiwiteit oor te skakel en met 'n ander te begin as jy moet?

1. Dit is die meeste van die tyd moeilik	1
2. Dit is soms moeilik	2
3. Dit is dikwels maklik	3
4. Dit is feitlik altyd maklik	4
5. Dit is altyd maklik	5
6. Ek weet nie	6

8. NATUURKENNER

Het jy al ooit 'n troeteldier of ander diere grootgemaak?

1. Nooit nie, of selde	1
2. 'n Bietjie, eenmaal	2
3. Soms	3
4. Dikwels	4
5. Die hele tyd	5
6. Ek weet nie	6

Is jy ooit nuuskierig oor die natuur en soek jy ooit na diere in die bos, of versamel jy plante, goggas of ander dinge?

1. Nooit nie, of selde	1
2. So af en toe	2
3. Soms	3
4. Dikwels	4
5. Feitlik die hele tyd	5
6. Ek weet nie	6