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A case study on the impact of sensory processing difficulties on the learning and development of two Asperger's syndrome learners in grade R

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A CASE STUDY ON THE IMPACT OF SENSORY PROCESSING DIFFICULTIES ON THE LEARNING AND DEVELOPMENT OF TWO ASPERGER'S SYNDROME LEARNERS IN GRADE R.

by

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Supervisor: **Dr Janet Condy**
Co-supervisor: **Prof Rajendra Chetty**

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DECLARATION

I hereby declare that an investigation into *the impact of sensory processing difficulties on the learning and development of two learners experiencing Asperger's Syndrome in Grade R* is my own work and that it has not been submitted for any degree in any other university.

Signed: ....

Petronella Susanna de Jager

Date: ....

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ABSTRACT

The purpose of this study was to explore the impact that sensory processing had on the learning and development of two Grade R learners that experience Asperger's Syndrome.

The present study is grounded in theories originating from the works of Piaget (1973 & 1978), Vygotsky (1978 & 1993), Feuerstein (1980 & 1991) and Erikson (1950). The informal, flexible education experienced in Grade R classes reflects both the OBE curriculum and inclusive education systems found in South Africa. The main medium of learning is through sensory experiences, therefore it was necessary to research how two AS learners would learn and develop and explore their world through their senses.

This research approach was purely qualitative. Multi-methods of data collection, particularly interviews and observations were used. The sample size was two independent case studies, using learners aged between five and seven, who had been clinically diagnosed with Asperger's Syndrome (AS). The two AS learners both attended mainstream Grade R classes and both had facilitators.

The findings of the study answer the key research question: "What is the impact of sensory processing difficulties on the learning and development of two learners experiencing Asperger's Syndrome in Grade R?" The results confirmed the impact sensory processing had on the learning and development of learners experiencing AS. The learners had difficulty learning new skills and concepts. Although they were both bright learners, they were perceived as underachievers. Identifying these sensory difficulties and creating awareness among educators, can have a positive impact on these learners' adaptability in a mainstream school environment.

This study recommends that early intervention with AS learners is vital for their future learning and development. The interpretation of body language and social skills of normal learners needs to be taught to learners with AS so they can begin to socialise with other learners positively. Ebersöhn & Eloff (2006) suggest that knowledge of asset-based good practices should be shared with educators and caregivers, so that they can focus on the AS learners' strengths and positive character traits. The multi-disciplinary team need to work together to offer support to these learners assisting them to develop to their full potential.

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LIST OF ABBREVIATIONS

AS	Asperger's Syndrome
ANC	African National Congress
APA	American Psychiatric Association
ASD	Autistic Spectrum Disorder
DoE	Department of Education
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders 4th ed.
DSM-V	Diagnostic and Statistical Manual of Mental Disorders 5th ed.
ED.	Education
Ed.	Edition
et al.	and others
GP	General Practitioner
LSEN	Learners with Special Educational Needs
OT	Occupational Therapist
IQ	Intelligence Quotient
MLE	Mediated Learning Experience
NCS	National Curriculum Statement
NDoE	National Department of Education
OBE	Outcomes-based Education
PDD	Pervasive Development Disorder
SA	South Africa
SCM	Structural Cognitive Modifiability
SIAS	The National Strategy on Screening, Identification, Assessment and Support
SNAP	Special Needs Adapted Program
SPD	Sensory Processing Disorder
ToM	Theory of Mind
WCED	Western Cape Education Department
ZPD	Zone of Proximal Development

CHAPTER 1

1.   INTRODUCTION

According to the study of Education White Paper 6 on *Special Needs Education: Building an inclusive education and training system* (2001: 9), only twenty percent of learners with disabilities are accommodated in special schools. This means that the remainder of learners with special needs have to be assessed within the Curriculum 2005 framework. The Curriculum 2005 *Assessment Guidelines for Inclusion* clearly shows the commitment of the education system to 'minimise the impact of a range of intrinsic and extrinsic barriers upon the assessment performance of the learner' (National Education Department, 2002: 9). It is within this context that we should move towards an inclusive paradigm in the South African education system, in order to cater for the needs of ALL learners.

This present study was conducted in 2008 as a strategy to recognise the unique characteristics of learners experiencing Asperger's Syndrome (AS). This case study is an investigation into the identification of sensory processing difficulties experienced by learners experiencing AS while attending a Grade R mainstream school, and the impact sensory processing difficulties had on their learning and development. The investigation was done by observing their responses to sensory input that they experienced while interacting within their immediate environment.

This chapter discusses the origin and background of the study, importance of the problem, context of the study, approach, purpose and goals of the study. It introduces the research question to be answered, clarification of terms, the significance of the study, limitations and finally assumptions of the study.

1.1   ORIGIN AND BACKGROUND OF THE STUDY

In 1943 a Viennese physician, Hans Asperger, described a group of children who were affected with severe social impairment. This description was based on investigations of more than 400 children. He termed the condition 'autistic psychopathy', meaning autism (self) and psychopathy (personality disease). As he did not travel much and all his publications were in German, his name, until recently, was not well known (Attwood 1998).

Asperger (in Frith, 1991) identified a consistent pattern of abilities and behaviour that predominantly occurred in boys. In his published paper in 1944, he described a pattern of behaviours in several young boys who had normal intelligence and language development, but who also exhibited autistic-like behaviours and marked deficiencies in social and communication skills. The variety and consistent pattern of behaviours he identified were: a lack of empathy, a lack of eye-contact, difficulty reading non-verbal cues, an intense absorption in a special interest, difficulty with transitions and changes, clumsy motor movements and being overly sensitive to smell, taste, sound and sight. He identified that many behaviours that seemed odd and unusual were due to neurological differences and not the result of intentional rudeness or bad behaviour (Kirby, 2001). While Asperger initially diagnosed the syndrome in 1944, it was not until Lorna Wing introduced the term 'Asperger's Syndrome' (AS) in 1981 that a myriad of research has been done by English speaking practitioners and researchers.

Attwood (2007: 36) mentions that Hans Asperger died in 1980, and was unable to comment on the interpretation of his study by English-speaking psychologists and psychiatrists. It was however only relatively recently, in 1991, that his original paper on autistic personality disorder was translated into English by Frith (1991). Since then more than 2000 studies, and more than 100 books have been published on AS, with reference to this translation. This interest, according to Attwood (2007: 37), has shown an increased referral rate for diagnostic assessments of AS.

Klin et al. (2006: 221) state that although 'Asperger's Syndrome' was described more than fifty years ago by Asperger, it was not officially recognised in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM). It was not until the fourth edition of the DSM version of the *American Psychiatric Association* (APA) (1994: 74) that it was included as one of five pervasive developmental disorders (PDD). PDD are disorders that have some similar characteristics and have serious impairments in several developmental areas. This meant that AS could be differentiated from Autism, Rett's Syndrome, Childhood Disintegrated Disorder, and Pervasive Developmental Disorder, not-otherwise- specified.

Table 1.1 Shows the autistic spectrum of the five Pervasive Developmental Disorders

AUTISM	RETT'S SYNDROME	CHILDHOOD DISINTEGRATED DISORDER	ASPERGER'S SYNDROME	PERVASIVE DEVELOPMENTAL DISORDER (PDO) (BORDERLINE)

←AUTISM---PDO→

According to Dunn et al. (2002: 97-102), the revised copy of DSM-IV (2000) contains the most widely used diagnostic criteria for identification of AS (See Table 1.3, on page 12). However Attwood (2007: 43) argues that there are significant problems with the diagnostic criteria of DSM-IV. According to Attwood the DSM-IV does not include descriptions of the following characteristics:

- unusual characteristics in the pragmatic aspects of language;
- sensory processing, especially auditory, sensitivity and hypersensitivity to light intensity, tactile experiences and aromas; and
- motor clumsiness.

According to my own experiences, working with AS learners for the past five years, there are many learners diagnosed with AS that are currently being educated in the mainstream inclusive school settings in South Africa. Under the first democratically elected government, that was led by the African National Congress, (ANC) in 1994, there has been a restructuring in the education and training system. The National Department of Education (NDoE: 4) had a vision to create a single, national non-discriminatory school system by articulating the new constitution (1996), the White Paper on Education and Training (1995). and the South African Schools Act (1996. Act no 108). According to Botha (2002: 361 - 371), in 1996 Curriculum 2005, that was launched by Minister Sibusiso Bengu (Minister of Education) marked the departure of content-based teaching and introduced a learner-centred approach. This focused on what the learner should know, and recognised and built on their own knowledge, experiences and needs. The learning experiences would include knowledge, skills, attitudes and values and take into account different learning styles. The National Curriculum Statement (NCS) (2002: 5) provided the framework for the adoption of an Outcomes-based Curriculum.

As part of this transformation, the White Paper 6 (2001: 8) addresses the need for inclusivity and makes it clear that all learners need to be assessed within the same curriculum and assessment standards. It also outlines how to assist learners who experience barriers to learning which includes learners who have been diagnosed with AS.

1.2   IMPORTANCE OF THE PROBLEM

As more and more AS learners are educated in an inclusive educational setting (White Paper 6, 2001), it has become important to explore the unique characteristics of these learners. One needs to form an understanding of how these learners perceive their world and in turn cater for their needs and support their inclusion in the mainstream school environment. This is especially true when it comes to the unique way they perceive their world through their senses.

Until recently, not much research or interest has been shown in the field of AS and its unusual sensory sensitivity (Harrison & Hare, 2004: 727, Smith Myles et al., 2005: 20).

A study done by Dunn, Smith Myles & Orr (2002: 97 - 102) examined whether children experiencing AS have a distinct sensory processing problem. The researchers compared the performance of forty-two children with AS and forty-two without disabilities. The result showed that there was a significant difference in the sensory processing pattern of children with AS when compared to their peers without disabilities. I thus concur with Attwood (2007: 10), when he states that clearly, more research has to be done, particularly into the aspects of sensory perception.

Attwood (2007: 271) mentions that some AS adults consider their sensory sensitivity to have had a bigger impact on their daily lives than making friends, managing emotions and finding employment. He states:

> The child with sensory sensitivity becomes hyper vigilant, tense and distractable in sensory stimulating environments such as the classroom, unsure where the next painful sensory experience will occur.

1.3   CONTEXT OF THE STUDY

For the past fourteen years I have taught in a pre-primary environment and five years ago was given the opportunity to offer support to three learners experiencing AS, in a private capacity. During this time I developed a passion for working with learners with AS. My focus for my teaching has been to help them acquire the cognitive and perceptual skills necessary for their scholastic development so that they can ultimately attend a mainstream school.

The initial context of this study was to locate three learners aged between five and seven years of age who were experiencing AS and were attending a mainstream Grade R class in the Western Cape. I was under the impression that all three learners were clinically diagnosed with AS and were likely to provide me with greater understanding of the concept of my research focus. They were all attending separate Grade R classes, in and around the Cape Peninsula.

On my visit to the schools of all three learners, learner 1[1] and learner 2 fitted the profile of my proposed study. They were both assessed at the age of four by a paediatrician who specialised in Paediatric Neurology. Her diagnoses were that both learners 1 and 2 showed concerns about behaviour which pointed towards Autistic Spectrum Disorder (ASD), but that it would be difficult to commit to such a diagnosis at that point, as both learners seemed to have other issues which needed further clarification. After a second opinion was sought by both sets of parents, both learners were diagnosed with AS by independent child psychologists.

Learner 3, according to his educator, was unofficially diagnosed with AS, as he showed traits of autistic behaviour. These were: lack of focus, wandering around and living in his own fantasy world with a fixation with dinosaurs, and showed signs of emotional, social and cognitive delays with a limited vocabulary. His parents showed resistance to making such an early diagnosis of AS. They felt he still needed to mature and did not want their son to be 'labelled' at such a young age. His attendance at school was also erratic and the educator mentioned that this made it difficult to get a thorough assessment of his general development. Lovecky (2005: 101) mentions that it is not uncommon for a learner experiencing AS to only display the main difficulties of this disorder once they enter into

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1   For the purpose of confidentiality I will refer to each learner as 'learner 1,2, and 3'.

formal settings, such as school. He further states that the earlier descriptions of AS did not focus much on early development, as Asperger (1944) thought. Asperger believed that the early development of these children was essentially experienced as 'normal'. Taking all this into consideration, I made the decision to exclude learner 3 from my study.

In the following discourse I will discuss learner 2 first as he is older than learner 1. Learner 2 attended an independent mainstream pre-primary school since January 2006 (age 4 years), and learner 1 since January 2007 (age 4 years). Both the learners' educators had concerns about these children's progress and developmental milestones. Learner 2's educator's concerns were: social skills difficulties, that he lived in a fantasy world, did not listen when spoken to, aggressive play, concerns regarding fine motor skills and defiant uncooperative behaviour. The educator requested that his parents have him formally assessed. Learner 1's educator raised similar concerns, as he could not sit still and would just wander around making inappropriate noises, could not carry out a simple instruction, speech was very unclear, showed signs of social/emotional and cognitive delays and had a fixation with electrical appliances and wires. She recommended that his parents seek professional intervention and obtain a formal diagnostic evaluation.

In the beginning of 2007, learner 2 attended a six month intervention programme called – Special Needs Adapted Program (SNAP). In July 2007 he returned to the mainstream pre-primary with a SNAP facilitator to assist him. In 2008 he was accepted in the Grade R pre-primary class, without the assistance of a private facilitator. With regard to formal school education for 2009, it was recommended that he attend a school that offered smaller classes with a remedial facility that could assist him manage the curriculum in Grade 1.

In 2008, recommendations were made by the psychologist, that learner 1 attends speech and occupational therapy. He recommended that learner 1 could manage in a mainstream school environment, with a facilitator to guide and assist him. Currently learner 1 has a facilitator to assist him in the morning and attends speech and occupational therapy on a regular basis. It has also been recommended that learner 1 spends an extra year in Grade R before he attends a mainstream school in the year 2010. The schools that were recommended for Grade 1 were schools with fewer class numbers and a learning support educator that assists learners with special needs.

1.4   THE APPROACH TO THE STUDY

There has been limited research done on learners with AS in South Africa. The only references I have managed to identify are unpublished theses (Sanders 2003 & 2006, Van Vollenstee 2006, Horn 2007). The need to research these learners is of importance, especially when it comes to how they perceive their world in a mainstream classroom. It is only since Inclusive Education has been part of our South African school system that educators have been identifying learners with AS and the unique ways they perceive their world in mainstream classrooms. This has made me aware of the importance of sensory processing, and the influence it can have on the development of Grade R learners with AS. I have noticed, while working one-on-one with these learners, that they have a number of sensory problems such as: hearing, vision, moving and touching. This would often make them feel anxious and insecure and I wondered how this would influence their abilities to function in a mainstream education class. Hence, this concern became the focus of my current research.

I concur with Gillberg (2002: 22) when he stated that developing an early intervention plan should result in encouraging sensory processing skills in learners who experience AS. Such interventions could assist with how learners react to loud noises, uncoordinated movements and emotional peculiarities, and alleviate sensitivity to bright light and tactile experiences. In the past my intervention programme entailed reducing their anxiety and clumsiness and helping them to develop positive social participation skills. I believe that identifying these difficulties and assisting these learners make sense of their world, may have a positive impact on their adaptability in a mainstream school environment.

As many learners experiencing AS attend mainstream schools and have to be assessed within the same curriculum and assessment framework, it is important to mention the NDoE's view on Inclusive Education. White Paper 6 (2001: 17) states:

> Inclusion is about recognising and respecting the differences among all learners and building on their similarities.

The policy further mentions that Inclusion is about the support of not only the learners, but the educators and the inclusive system as a whole with emphasis on development and good teaching strategies with an adaptive support system that will be of benefit to all

learners in need.

Curriculum 2005 Assessment Guide for Inclusion (2002: 4) emphasises that any practice must be cognisant of the following:

- all learners can learn, given the necessary support;

- OBE is learner-paced and learner-based;

- schools create the conditions for learners to succeed;

- there is a shift from categorising/labelling learners according to disability towards addressing barriers experienced by individual learners; and

- provision should be based on the levels of support needed to address a range of barriers to learning.

In theory, the White Paper 6 policy is sound. But in practice it has proven to be difficult as much planning has to be done to co-ordinate the implementation of structures and putting them in place for the smooth running of programmes. Over the past four years, the NDoE, has developed a National Strategy Programme, as part of the implementation of Education White Paper 6 (2001). More recently, in 2008, the National Strategy on Screening, Identification, Assessment and Support (SIAS) was introduced to all South African officials, schools, teachers, learners and parents. Hindle (2008: 18), states:

> that the introduction of this strategy will allow large numbers of children in school-going age who experience barriers to learning, including those who are disabled, to exercise their right to basic education and to access the necessary support in their local schools as far as possible.

According to the principals and educators of both learners in my study, they had embraced the challenge of attempting to include both learners who are experiencing AS, by conducting their own individual research on AS, attending workshops, and allowing a facilitator to assist and support the learners in the classroom. According to both educators, these support strategies have made them aware of the unique way these AS learners perceive their world. During their planning, they had made provision for the following: the AS learner's unique learning style, their special interest, their perceptual difficulties, and

their social and motional impairments. They had made sure that the learners knew what was expected of them, that the learners were aware of the behaviour that attracted positive and negative attention, and that they were reminded of the classroom rules and regulations and pre-warned of any changes in the daily routine.

As these learners have a limited attention span, and difficulty in comprehending theory of mind (ToM)[2], the educators worked closely with the facilitators for additional support, and to assist in positive reinforcement of the implementation of the outcomes and assessment standards of the curriculum.

1.5 PURPOSE AND GOAL OF THE STUDY

There has been a significant increase in the acknowledgement of the term 'Asperger's Syndrome' world wide. According to Smith Myles & Simpson (2002: 38 - 44), educators have only just begun to learn to associate the characteristics and use effective interventions with learners who experience AS. As research, done on AS in the South African context is limited, I believe this process of early recognition is still very much in the beginning stages. Thus the purpose of this study was to contribute to the available information on AS learners in the inclusive settings in South African schools.

My goal is to describe, in detail, the sensory processing difficulties learners in Grade R experience and the impact that they have on their learning and development. Barnhill (2001: 259) maintained that it is imperative to disseminate knowledge regarding the characteristics of AS, so that this condition can be recognised early, and appropriate interventions can be provided to support learners with AS in coping successfully. I agree that identifying their difficulties and assisting learners experiencing AS to make sense of their world, can have a positive impact on their adaptability in a mainstream school environment.

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2   Theory of Mind (ToM) means the ability to recognise and understand thoughts, beliefs, desires and intentions of other people in order to make sense of their behaviour and predict what they are going to do next (Baron-Cohen,1995).

1.6   RESEARCH QUESTION

The key question in this study is:

What is the impact of sensory processing difficulties on the learning and development of two learners experiencing Asperger's Syndrome in Grade R?

This identified problem led to the formulation and seeking of answers to the following two sub-questions:

- What are the sensory processing difficulties experienced by learners experiencing Asperger's Syndrome within a mainstream Grade R class environment?

- What impact does sensory processing difficulties have on the learning and development of learners experiencing Asperger's Syndrome in a Grade R class environment?

1.7   CLARIFICATION OF TERMS

1.7.1   Asperger's Syndrome

The first diagnostic criteria of Asperger's Syndrome, or Asperger's Disorder, was published in 1989 (Gillberg & Gillberg), and only recently revised by Gillberg (1991: 123) as can be seen in Table 1.2, on page 11. Attwood (2007: 36) argues, that Gillberg's definition of AS, resembles the original description of AS. The DSM-IV (1994: 80) refers to Asperger's Disorders and not Asperger's Syndrome and this definition can be seen in Table 1.3, on page 12. The DSM-IV was revised in 2000 although the definition of AD has remained the same.

According to Gillberg (2002: 13) other synonyms used to refer to Asperger's Syndrome are: Autistic psychopathy, high functioning autism and Asperger Disorder. From my readings I have noted that Asperger's Syndrome is the preferred term used by most recent researchers and clinicians, therefore I have chosen to refer to AS throughout my study.

Smith Myles et al. (2005: 22) define AS as follows:

> A disorder ……. characterized by the same kind of qualitative abnormalities of reciprocal social interaction that typify autism, together with a restricted, stereotyped repetitive repertoire of interests and activities.

They mention however, that the disorder differs from autism primarily in that there is no general delay or retardation in language or cognitive development. AS learners seem to have normal to above normal intelligence, but it is common for them to be markedly clumsy.

Table 1.2 Characteristics of Asperger's Syndrome according to Gillberg (1991)

The Gillberg diagnostic criteria for Asperger's Syndrome (Gillberg 1991)
1. Social impairment (extreme egocentricity) (at least two of the following): • difficulties interacting with peers • indifference to peer contacts • difficulties interpreting social cues • socially and emotionally inappropriate behaviour.
2. Narrow interest (at least one of the following): • exclusion of other activities • repetitive adherence • more rote than meaning.
3. Compulsive need for introducing routines and interests (at least one of the following): • which affects the individual's every aspect of everyday life • which affects others.
4. Speech and language peculiarities (at least three of the following): • delayed speech development • superficially perfect expressive language • formal pedantic language • odd prosody, peculiar voice characteristics • impairment of comprehension including misinterpretations of literal/implied meanings.
5. Non-verbal communication problems (at least one of the following): • limited use of gestures • clumsy/gauche body language • limited facial expression • inappropriate facial expression • peculiar, stiff gaze.
6. Motor clumsiness • poor performance in neuro-developmental test.

Table 1.3 Characteristics of Asperger Disorder according to the DSM-IV (APA) 2000

Diagnostic criteria of Asperger Disorder according to DMS-IV (TR) (APA) 2000

A. Qualitative impairment in social interaction, as manifested by at least two of the following:
    1. marked impairment in the use of multi non-verbal behaviours such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction
    2. failure to develop peer relationships appropriate to developmental level
    3. a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g. by a lack of showing, bringing, or pointing out objects of interest to other people)
    4. lack of social or emotional reciprocity.
 	
B. Restricted repetitive and stereotyped patterns of behaviour, interests, and activities, as manifested by at least one of the following:
    1. encompassing preoccupation with one or more stereotyped and restricted patterns of interest that are abnormal either in intensity or focus
    2. apparently inflexible adherence to specific, non-functional routines or rituals
    3. stereotyped and repetitive mannerisms (e.g. hand or finger flapping or twisting, or complex whole-body movements).
 	
C. The disturbance causes clinically significant impairment in social, occupational, or other important areas of functioning.
 	
D. There is no clinically significant general delay in language (e.g. single words used by age two years, communicative phrases used by age three years).
 	
E. There is no clinically significant delay in cognitive development or in the development of age-appropriate self-help skills, adaptive behaviour (other than in social interaction), and curiosity about the environment in childhood.
 	
F. Criteria are not met for another specific Pervasive Developmental Disorder or Schizophrenia.

1.7.2   Sensory processing issues

Kranowitz (2005: 9) notes that: Sensory Processing Disorder (SPD) is the inability to use information received through the senses in order to function smoothly in daily life. She mentions that SPD happens in the nervous system and when processing is disorderly, the brain cannot do its most important job of organising sensory messages.

Ineffective processing can involve all seven senses: tactile, visual, auditory, vestibular, proprioceptive, gustatory and olfactory. It occurs in the central nervous system, where the flow of the sensory input and the motor output are disrupted as a result of the neuronal connections in the central nervous system, and makes the processing ineffective. This occurs because the sensory nervous system does not send effective messages into the central nervous system, or the motor neurons do not send effective messages out to the body for adaptive behavioural responses (Kranowitz, 2005: 10).

In relation to AS and sensory processing, Kranowitz (2005: 33) mentions that AS learners tend to be anxious, poorly coordinated and eccentric. They often have difficulty with hearing, vision, moving, touching and other sensory areas.

1.7.3 Link between learning and development

Children are active participants in their own development, reflecting the intrinsic human drive to explore and master one's environment (Shonkoff & Phillips, 2002: 27). According to White Paper 5 (2001: 7), the largest part of brain development happens before a child reaches formal school going age. It is during these early years of development that children develop their abilities to think, speak, learn and reason and lay the foundation for their values and social behaviour as adults.

The optimal development of children is considered vital to society and so it is important to understand the learning and development of children. This embraces five dimensions:

1.   physical well-being and motor development;
2.   social and emotional development;
3.   approaches towards learning;
4.   language and cognitive development; and
5.   perceptual and general development.

Increased research and interest in this field has resulted in new theories and strategies, with specific regard to practices that promotes development within the school system. Erikson's (in Boeree, 2006: 7) theory on psychosocial development, stage 3, pertains to the preschool years of a child's development. Young children aged four to six years face the challenge of 'initiative versus guilt'. During this stage of development they face the complexities of planning and developing a sense of judgement.

1.7.4 Mainstreaming

Mainstreaming is the educational equivalent of the normalisation principle which suggests that people with disabilities have a right to life experiences that are the same, or similar to those of others in society. The goal of mainstreaming is to return learners with disabilities to the mainstream of education as much as possible, alongside normally developing peers (Landsberg et al., 2005: 7).

1.7.5 Inclusive Education and Training in the South African context

White Paper 6 (2001: 6) defines inclusive education and training as:

* acknowledgement that all children can learn and need support;
* that educational structures, systems and learning methodologies meet the needs of all learners;
* acknowledging and respecting differences in all learners;
* broader than formal schooling and acknowledging learning from home and community, within formal and informal settings and structures;
* changing attitudes, behaviour, teaching methods, curricula and environment to meet the needs of all learners; and
* maximising the participation of all learners in the culture and the curriculum of educational institutions and uncovering and minimising barriers to learning.

1.7.6 Outcomes-based Education (OBE) in South Africa

Firmani et al. (2003: 6) argues that in OBE one begins to think about the outcome – what learners will be able to do, know and value as a result of their experience of learning and teaching. With the stating of the outcome, the educators begin to think about learning as a whole,what knowledge and skills need to be learned and what values and attitudes will lead to the successful achievement of the outcome. There are specific outcomes written into the new curriculum for Grade R to Grade 3, and they fall under critical and developmental outcomes. See Appendix 7, on page 176.

1.7.7 National Curriculum Statement in South Africa

Meij & Sullivan (2003: i) state that the NCS tries to realise the goals set out in the Constitution of the Republic of South Africa and aims to develop the full potential of each learner as a citizen of a democratic society. The principles that are set out and underline the NCS are: social justice, a healthy environment, human rights, inclusivity, outcomes based education, a high level of skills and knowledge for all, clarity and accessibility and progression and integration.

A document to review the implementation of the NCS was presented to the Minister of Education, Minister Motshekga, by the Task Team in October 2009. The team was appointed to investigate the nature of the challenges and problems experienced in the implementation of the NCS and to develop a set of recommendations designed to improve the implementation of the NCS.

1.8   SIGNIFICANCE OF THE PROPOSED STUDY

Often learners who experience AS do not process sensory input accurately and then their responses to certain sensory stimuli are assumed to be immature, defiant, or even aggressive by educators. In reality they are feeling anxious, ill or distressed and are just reacting to those feelings (Wagner, 1999: 21, Smith Myles, et al., 2005: 39).

Individuals experience the world through their senses all the time, and it is therefore important to identify these sensory processing issues that AS learners experience at an early age. The awareness of the possible responses from these learners will assist in finding strategies to assist them to address the sensory stimuli in a more positive and constructive way.

The present study evolved out of a concern for young learners experiencing AS. Since inclusive education is still in its formative years, and limited research has been done in South Africa with AS, and their reactions and responses to sensory stimuli, I thought it was an important study to undertake.

The educators of both AS learners were aware of the term 'Asperger's Syndrome', but could not identify or understand some of the responses they would observe from their learners in question. Since I had spent time with AS learners and have done individual

research on the characteristics of learners experiencing AS, I could assist by explaining the possible reasons for the learners' responses in certain situations.

Powell (2000: 14) states that there are two main aspects to the education of children identified with Autism and AS. Firstly, the education is a treatment of these syndromes. The main goal is to address and reduce the traits of impairment over a relative short-time intervention. Secondly, education is an entitlement, where the goal is to offer the widest possible educational experience and choice that will enable equal participation, equal access to mainstream educational opportunities and wider inclusion into society.

1.9 LIMITATIONS OF THE STUDY

This study is limited to two learners experiencing AS in the Western Cape. I did not include learners with AS from other schools as there are not many. This assumption is justified by (Smith Myles et al., 2005; Kranowitz, 2005 & Attwood, 2007), when they mentioned that often these learners only start to 'feel different' and show characteristics of an AS learner when they enter into formal schooling and extra pressure is put on them to achieve in all situations. This is often when 'the wheels come off' and they get sent for a formal diagnosis as AS individuals.

This study focuses on Grade R learners aged between five and six years. I believe, that even though this study is limited to this age group, it does not make the study less significant. Baron-Cohen & Bolton (1993: 140) argue that early diagnosis offers the hope that treatment starts before the conditions have pushed the child too far off the normal course of development. I concur with him, and believe that early diagnosis of the impact that sensory processing can have on AS learners' learning and development, can assist educators to be more open minded to how AS learners respond in certain situations to make sense of their world.

1.10   ASSUMPTIONS OF THE STUDY

The study makes a reasonable assumption that all AS learners that attend mainstream schools in South Africa have a backup support system, where the educators are aware of their characteristics and are equipped to assist or support these learners.

It was assumed that all AS learners have sensory processing difficulties that affect their daily lives. Research done by Smith Myles et al., (2005: 1) supports sensory processing as a problem area, but while some behaviours and reactions are problematic and interfere with work and play, others result in successful interactions.

Another assumption was that AS learners can accomplish most of the outcomes and assessment standards for Grade R, as stipulated in the NCS (2002), with support structures that are put in place, to assist them in attending a formal mainstream school for formal education.

1.11   ORGANISATION OF THE THESIS

Chapter 1: is the introductory orientation and formulation of the research problem. This chapter is an overview and states the origin of the problem, importance, context, approach and purpose and goal of the study. The key terms have been clarified and the significance, limitations and assumptions were verified. This chapter placed the study in perspective and orientated the reader to the nature of the study.

Chapter 2: focuses on the educational theories on learning and development of theorists (Piaget, Vygotsky, Feuerstein and Erikson) that forms the theoretical framework for the study. In this chapter the informal, flexible education experienced in Grade R classes, that reflects both the OBE Curriculum and Inclusive Education system found in South Africa, is discussed. The characteristics of learners who experience AS is debated, with the focus on sensory processing difficulties to answer the first problem statement of this research. This chapter presents recent research and debates on how sensory difficulties could have impacted on learner's learning and development.

Chapter 3: outlines the case - study approach used. Multi-methods of data collection, consisting of interviews and observations was used as the instruments, design and implementation of the research process. The sample size was two independent case studies, using learners aged between five and seven, who had been clinically diagnosed with Asperger's Syndrome and are attending a Grade R class in and around the Cape Peninsula.

Chapter 4: presents the research results. This chapter analytically discusses the findings of the two research questions.

Chapter 5: discusses the results, draws conclusions, makes recommendations for future research and outlines limitations of this study.

CHAPTER 2

2. LITERATURE REVIEW

2.1 INTRODUCTION

The purpose of this chapter is to present, critically, the theoretical and conceptual frameworks which informed and guided the design of this thesis.

The Conceptual Framework Model, presented in Figure 2.1, on page 20, adapted from Condy (2006: 32), summarises the main theoretical frameworks used to clarify the processes of identifying the processing difficulties on the learning and development of learners experiencing AS in a Grade R class. The six theoretical components are:

2.1   the central research question;

2.2   the theoretical framework underpinning Chapter 2;

2.3   a discussion on inclusive education within an Outcomes-based Education system in South Africa;

2.4   a review of the historical development of AS;

2.5   a description of the characteristics of learners experiencing AS; and

2.6   the impact of sensory processing on learners experiencing AS.

The final circle refers to and includes all educational researchers and clinicians who advocated sensory processing and learning and development in learners experiencing AS.

Figure 2.1: An overview of the Conceptual Framework Model

2.2   THEORETICAL FRAMEWORK

The theoretical framework provides an orientation of the study, reflects the stance the researcher adopted, and it frames the key concepts of the research study (Henning, 2007: 25). The importance, thus, of having a theoretical framework in this study is that it positions my research within the concepts of stages of cognitive development, interaction between learning and development, abnormal psychology and learning disability, and cognitive modification. It makes explicit the assumptions about how mediated learning influences how children acquire knowledge.

The next section will examine these concepts and will focus on the views of four psychologists: Piaget (1978), Vygotsky (1978 & in Boeree 2006), Feuerstein (1980 & 1991) and Erikson (in Boeree, 2006). Both Vygotsky and Feurstein developed their theories under the strong influence of Jean Piaget. Their theoretical positions are examined under the following five headings:

- Piaget's theory on stages of cognitive development;
- Vygotsky's theory on the interaction between learning and development and approach to mediated learning;
- Vygotsky's theory on abnormal psychology and learning disability;
- Feuerstein's theory on cognitive modification and his approach to mediated learning;
- Erikson's phychosocial theory on initiation without too much guilt; and
- Ebersöhn & Eloff's theory asset-based approach

To conclude this section on the theoretical framework, I will discuss the asset-based approach, debated by Ebersöhn & Eloff (2006), as a trend in sustainable programmes which, according to them, support vulnerable children.

2.2.1   Piaget's theory on stages of cognitive developmentds

Boeree (2006: 2) states that Piaget's theory on how children acquire knowledge is still widely accepted. The purpose for including Piaget's theory on cognitive development is that stage one (the sensori-motor stage) and stage two (the pre-operational stage) of his theory on stages of cognitive development pertain directly to the normal evolving

developmental stages of the children. These two stages of Piaget's cognitive development will now be further discussed.

2.2.1.1 Piaget's theory on the sensori-motor stage

This stage lasts from birth to the age of about two. As the term implies, the infant uses senses and motor abilities to understand the world, beginning with reflexes and ending with complex combinations of sensori-motor skills. A child is constantly engaged in seeking a state of balance or equilibrium between previous knowledge and new things encountered in the world. Learning occurs when the equilibrium takes place in sensory experiences and movement.

As learners experiencing AS are characterised with having difficulty with sensori-motor skills in particular, the relevance of acknowledging this stage of development is of great importance to assist these learners making sense of their world (Ozonoff et al., 2007).

2.2.1.2 Piaget's theory on the pre-operational stage

This stage lasts from the ages of two to about seven, when the child has developed mental representation and is able to experience creative play. The equilibrium, or balance, is characterised by the use of symbols such as pictures and words to represent ideas and objects.

Learners experiencing AS often experience difficulties with internalising what they see, hear and feel. By being aware of these challenges, support can be given to assist them in acquiring this equilibrium of interacting physically with their environment (Minshew & Hobson, 2008).

Vygotsky (in (Kristinsdóttir, 2001: 1) did not fully agree with Piaget, as he saw the cognitive abilities as much more specific to the culture in which a child is reared. Vygotsky believed that culture makes two contributions to a child's development. Firstly, children acquire much of their thinking (knowledge) from their culture. Secondly, children acquire the processes or means of their thinking (tools of intellectual adaptation) from the surrounding culture.

In the following section, I will explain Vygotsky's view on children's cognitive development, and his theory on the role that mediated learning plays in this learning and developmental process.

2.2.2   Vygotsky's theory on the interaction of learning and development and mediated learning.

Vygotsky (1978: 82) argues that children's learning begins from the very first day of life. Vygotsky's paradigm is based on two presuppositions. The first is the actual developmental level. This is the level of development of a child's mental functions that occur as a result of an already completed developmental cycle. Vygotsky rejected the popular belief, associated with Piaget's theory, that instruction should follow the child's cognitive developmental stages. Vygotsky (1978) argues that higher mental processing can be considered as functions of mediated activity. He suggested two possible approaches that happen through influences of other individuals. Vygotsky (1978), expressed this in the following statement: "every function in a child's cultural development appears twice: first between people (inter-psychological), and then inside the child (intra-psychological)". To form an understanding of this statement one has to look at the second approach that focuses on the role of more capable peers or adults as mediators of meaning.

This second notion of Vygotsky's theory is the idea that the potential for cognitive development is limited to a certain level which he calls the 'Zone of Proximal Development' (ZPD). This refers to what children can do on their own, as the 'level of actual development'. He views this as a level that can be measured by a standard 'Intelligence Quotient' (IQ) test. He posits that this is undoubtedly important, but also incomplete. Vygotsky argues that what children can do with the assistance of others might be even more indicative of their mental development than what they can do alone.

Vygotsky (in Gauvain & Cole, 1978: 57) reasons that success in the ZPD is determined by the mental possibilities and constraints at the time, the significance of the mediation of the social world that mostly includes parents, educators, and more capable peers. According to Lytle (2003:75) the active process of 'scaffolding' originally termed by Bruner (1976) is the tutorial interaction between the adult and the child. The metaphor was used to explore the nature of aid provided by an adult for children learning how to carry out a task they

could not perform on their own. In the following section I will discuss Vygotsky's mediated approach in the classroom as noted in the WCED Educators Manual (2000: 28).

According to the WCED Educators Manual (2000: 19) teaching has to be understood as the process of mediation to learners of the cultural means of thought. It is believed that all social activity that conveys meaning, and is subsequently internalised by learners, can be described as 'teaching'. According to Vygotsky's theory, a teacher organises the framework of knowledge of a learner and consciously seeks to mediate cultural knowledge, systems and practices. Teachers should consider themselves as knowledgeable and not just facilitate, but be actively engaged in activities and respond to the learner's dilemmas and questions in the context of joint activity. The WCED Educators Manual (2000: 28) mentions that Vygotsky believed that true learning is based on logical thought, and is expressed in language. Therefore this approach regards active language practices, like critical dialogue, discussion and literacy, as the crucial formative activities of a school learning context. Learners must thus be encouraged to ask questions, to argue and to speak their minds on issues under study. The educators should further encourage group activities so learners can develop a higher level of cognitive functioning from their more knowledgeable peers.

As this study is also grounded in inclusive education, the next section will reflect on what Vygotsky's stance was on learners with special educational needs. Although in South Africa we currently use the term 'Inclusive Education', Vygotsky speaks about 'special educational needs'.

2.2.3 Vygotsky's theory on abnormal psychology and learning disability

Gindis (1999: 32) states that special education was the main empirical domain from which Vygotsky obtained data to support his general theoretical concepts. Vygotsky considered special education as a huge natural laboratory where general psychological laws were discovered on the basis of various anomalies. The uniqueness of Vygotsky's approach, according to Gindis (1999: 33), lies in: 'his understanding of the disability not as a biological impairment having psychological consequences, but as a socio-cultural developmental phenomenon.' Vygotsky (in Gindis, 1999: 34) explains further that: "A child whose development is impeded by a disability is not simply a child less developed than his peers; rather, he has developed differently." He believed that physical and mental

impairments could be overcome by creating alternative, but essentially equivalent roads of cultural development (Vygotsky (in Gindis,1999: 34).

Feuerstein had similar, yet slightly different views on how a child learns and acquires cognitive knowledge (Presseisen & Kozulin, 1992: 5). The following section will verify this statement.

2.2.4 Feuerstein and his theory on structural cognitive modification and his approach to mediated learning

Feuerstein (in Presseisen & Kozulin, 1992: 15) believed that all children could learn and that they are 'modifiable'. His theory on Structural Cognitive Modifiability (SCM) views human organisms as open, adaptable and amenable to change. Feuerstein argues that: Intelligence is not a static structure, but an open, dynamic system that can continue to develop throughout life. According to Presseisen & Kozulin (1992: 15) the approach to this theory is to modify the individual, emphasising autonomous and self-regulating change. This involves the capacity of an individual to be modified by learning and the ability to use whatever modification to further their cognitive advancement. Cognition, according to this theory, plays a central role in human modifiability.

Feuerstein & Feuerstein (1991: 5) also saw the mediated learning experience (MLE) as the interaction between the human being and their socio-cultural environment. They stated that MLE does not include all interactions, but is concerned with experiences that influence the individual's 'propensity to learn'.

There are three criteria for MLE (Feuerstein & Feuerstein, 1991: 5). They are: mediation of intentionality and reciprocity, mediation of transcendence, and mediation with meaning. The criterion of intentionality turns the interactive situation from a random, incidental experience into one that is intentional. The reciprocity of the first criterion underlines the fact that it is not the object, but the child's very cognitive processes that are the primary target of mediation. Transcendence is aimed at going beyond the goals of the particular interaction. This means that the mediator will offer broader definitions to enhance better understanding. Mediation with meaning is where meaning is obtained, through allowing constant questions of 'why', 'what for' and other reasons for something to happen or be done.

According to Presseisen & Kozulin (1992: 31) development is a dynamic process, and they maintain that human modification is gradual, as well as natural. Presseisen & Kozulin (1992) argue that Feuerstein's and Vygotsky's approaches towards mediated learning do not always match. Feuerstein makes an important distinction between functions (Vygotsky's concept), which serves as prerequisites of cognition, and cognitive operations which corresponds more or less to the Piagetian notion of intellectual operation.

2.2.5 Erikson's psychosocial theory on initiative without too much guilt

Erikson (in Boeree, 2006: 7) explains that from the age of four to six years, the task confronting every child is to learn 'initiative' without too much 'guilt'. Initiative means the positive response to the world's challenges, taking on responsibilities, learning new skills and feeling purposeful. This is the time of curiosity, imagination and fantasy play. The child is now capable of imagining a future situation, one that is not a reality right yet. Initiative is the attempt to make that non-reality a reality. This attempt may result in a feeling of guilt when his or her initiative does not produce the desired results.

2.2.6 Ebersöhn & Eloff's theory on asset-based approach

According to Ebersöhn & Eloff (2006: 457), the support of vulnerable children in education is one of the greatest challenges faced in educational transformation. This assumption is based on the fact that we live in a world where we primarily focus on problems, deficiencies and mistakes.

Ebersöhn & Eloff (2004: xi) assume that all individuals, as well as their environments, are endowed with multiple assets. These assets can be identified with the help of people in the caring professions. In partnership with counsellors, teachers, psychologists and social workers, individuals can identify and mobilise their interpersonal assets in order to cope optimally in their daily lives. Individuals should be able to mobilise their intra-personal assets (life skills) in conjunction with their contextual assets (family and support team).

This asset-based approach is, according to Ebersöhn & Mbetse (2003: 323), an alternative to the needs-driven approach and focuses on the capacities, skills and social resources of individuals and their community.

This approach aims to:

- facilitate empowerment or enablement of individuals;
- support the identification and mobilisation of their strengths, i.e. assets;
- collaborate in interpreting their feelings, cognitions and behaviour; and
- strive for their sustained independent living.

Ebersöhn & Eloff (2006: 457) suggest that knowledge of asset-based good practices could be shared with families in school-based sessions, and believe that this approach will develop schools', families' and communities' capacity to support vulnerable children in education.

In the following section of this chapter, the discussion will focus on how AS learners fit into the South African educational framework. Also what the South African National Department of Education has done, in their view, to ensure that these learners are successfully included into the OBE system.

2.3   INCLUSIVE EDUCATION WITHIN THE OBE SYSTEM

In order to understand the concept of Inclusive Education within the South African context, one first needs to reflect briefly on education in South African schools.

The Bill of Rights contained in the Constitution of South Africa (Act 108 of 1996), states that everyone has the right to receive education. We have a democratic educational system that embraces the National Curriculum Statement (NCS: 2002). This curriculum strives towards the principles of: outcomes-based education, social justice, a healthy environment, human rights and inclusivity. It also strives for a high level of skills and knowledge for all, clarity, accessibility, progression and integration (Firmani et al., 2003: 5).

The NCS's (2002:11) principles are derived from the Constitution and are contained in the South African Qualifications Act (Act No. 58 of 1995), where they describe the kind of citizen the education and training system should aim to create. OBE was adopted as fundamental for educational policy to improve the quality of education for all South Africans and considers the process of learning as important as the content. Both the process and the content of education are emphasised, describing the learning outcomes

(what learners should know and be able to do) and assessment standards (minimum level, depth and breath of what is to be learnt). For educators to facilitate the implementation of these outcomes and assessment standards as set out for Grade R (NCS Grade R in Appendix 6, on page 159), they are expected to be qualified, competent, dedicated, and caring to fulfil the seven roles of a teacher described in the Norms and Standards For Educators of 2000 (Government Gazette No 20844).

During an Education Conference, Taylor (2008: 1) argued that there are many dedicated educators who live up to these expectations and who provide their learners with the opportunities to become skilled and confident citizens able to sustain their families and contribute to building a new society. These educators and schools which nurture even a fraction of the talent of their learners' are very few and far between.

In Bloch's (2009) book that debates what is wrong with our schools, he argues that a majority of schools are just not producing the outcomes that are their chief objectives. Learners fail to learn the basics of how to study and advance through intellectual achievements, and fail to learn social skills and work attitudes that can carry them forward. According to Taylor (2008: 2), there are three main shortcomings that undermine effective teaching and learning:

1. poor time management, as many educators spend less than half their time teaching;
2. insufficient attention to text, as most of the educators do not understand the role of school knowledge in building and maintaining a developed society; and
3. very low level of teacher subject knowledge, as proved when a battery of tests was administered throughout the country to establish the proficiency rate of Grade 3 educators in numeracy and mathematics.

To ensure that learners can go back to the basics of reading and numeracy, Bloch (2009: 172) argues that there needs to be a determination to put the pedagogical and learning support in place. In July 2009 the Minister of Education, Minister Motshekga, appointed a panel of experts to investigate the challenges and problems experienced in the implementation of NCS and to develop a set of recommendations for improvement of the NCS.

The report (NdoE 2009) of the panel states that the new NCS document presents an understanding of the context, nature and causes of these pressure points. The report provided the Minister and NDoE with a five year plan to improve teaching and learning via a set of short-term interventions aimed at providing immediate relief and focus on teachers; and medium and longer-term recommendations with the vision to achieve real improvements in student learning within a five year period.

Despite facing all these challenges in building an education and training system, our Constitution requires all who are involved in education to give effect to the fundamental right to basic education to all South Africans. This includes learners with special educational needs.

2.3.1 Inclusive Education in South African mainstream schools

South Africa accepted a policy of inclusion by the publication of the White Paper 6 (2001) Special Needs Education - *Building an Inclusive Educational and Training System.* This policy provides a framework for a single inclusive system of education. However, since 2001, there has been a plethora of more recent documents published, pertaining to the practical implementation and theory of special education and inclusive education.

I will support this discussion by referring to the original document – the White Paper 6 (2001: 17). This document describes the differences between 'mainstreaming' and 'inclusion'. Table 2.1 below highlights these differences.

Table 2.1 The differences between 'Mainstreaming' and 'Inclusion'

'Mainstreaming'	'Inclusion'
Mainstreaming is about getting learners to 'fit' into a particular kind of system or integrating into this existing system.	Inclusion is about recognising and respecting the differences among all learners and building on their similarities.
Mainstreaming is about giving some learners extra support so that they can 'fit in' or be integrated into the 'normal' classroom routine. Learners are assessed by specialists who diagnose and prescribe technical interventions, such as the placement of learners in programmes	Inclusion is about supporting all learners, educators and the system as a whole so that the full range of learning needs can be met. The focus is on teaching and learning factors, with the emphasis on the development of good teaching strategies that will be of benefit to all learners.
Mainstreaming and integration focus on changes that need to take place in learners so that they can 'fit in'. Here the focus is on the learner.	Inclusion focuses on overcoming barriers in the system that prevent these from meeting the full range of learning needs. The focus is on the adaptation of and support systems available in the classroom.

More recently, the NDoE Directorate: Inclusive Education: Special Schools as Resource Centres (2003:11) refers to the shift from Special Education to Inclusive Education. Table 2.2 below illustrates this shift as envisioned by the NDoE as the conceptual framework that needs to take place.

Table 2.2 Shifts from Special Education to Inclusive Education

Theory	Special Education Theory	Inclusive Education Theory
Assumptions	- Pathological - Deficits within the child - Categories	- Barriers to learning. - Barriers in the system and environment. - Level of support needed e.g. high, moderate and low levels of support.
Practices	Segregation of learners into special facilities	Includes all learners and reorganises support.
Tools	Standardised tests	Criterion referenced tests and teacher produced tests that assess the potential to learn.
Model	Special Education Act	South African Schools Act
Pedagogy	Limited pedagogical possibilities	- Pedagogy of possibility taking into consideration barriers to learning, multiple styles of intelligences and learning. - High expectations expanded into learning opportunities.

In the conceptual and operational guidelines for the implementation of NDoE Directorate: Inclusive Education: Special Schools as Resource Centres (2003: 11), support is redefined to move its focus away from supporting individual learners who are assumed to have 'special needs' towards addressing barriers which prevent the system from responding to their learning and other needs. Firstly, it encourages mainstream schools to organise support in such a way that it becomes responsive to the needs of all learners. Secondly, it creates a realisation that there are other factors that produce barriers to learning such as language, poverty, class and health.

The National Strategy on Screening, Identification, Assessment and Support (SIAS) (2008), is the most recent document to be published in this field. This document provides assistance and guidelines for the process of implementing the White Paper 6 (2001), and

the Resource Schools initiative and serves two key purposes to assist classroom educators with identifying, assessing and supporting their learners. They are:

- to screen and identify learners who are experiencing barriers to learning and development; and
- to establish a support 'package' to address these barriers.

Hindle (2008: 3) maintains that the introduction of this strategy will allow children with disabilities of school going age, that previously were not able to exercise their right to basic education, to enter appropriate schools, including the local mainstream schools. Strategies are set out for educators to identify, assess and support their learners This document also introduces the variety of responsibilities of the educational support systems in the country which are: the District Based Support Teams, Resource Centres, Full Service Schools and Institution-level Support Teams.

In theory, these statements sound commendable, but too many schools and educators, that I have been in contact with over the past ten years, have been desperate for support in assisting them with screening, and providing support to learners who experience barriers to learning. The ideal situation is to have learners attend neighbourhood schools so they can continue their social development. It is becoming more and more important for schools to be empowered to be able to screen and offer support to their own learners in their own classroom environments.

In the following section I will discuss learners experiencing AS and their character traits, and how these learners function within an inclusive educational system.

2.4 HISTORICAL DEVELOPMENT OF AS

To fully understand the complexity of the development of the term 'AS', I will show the historical development of AS. Figure 2.2 describes the people who have previously worked with AS, their professional backgrounds, and the terminology they used when referring to AS.

Figure 2.2 The historical development of the definition of AS
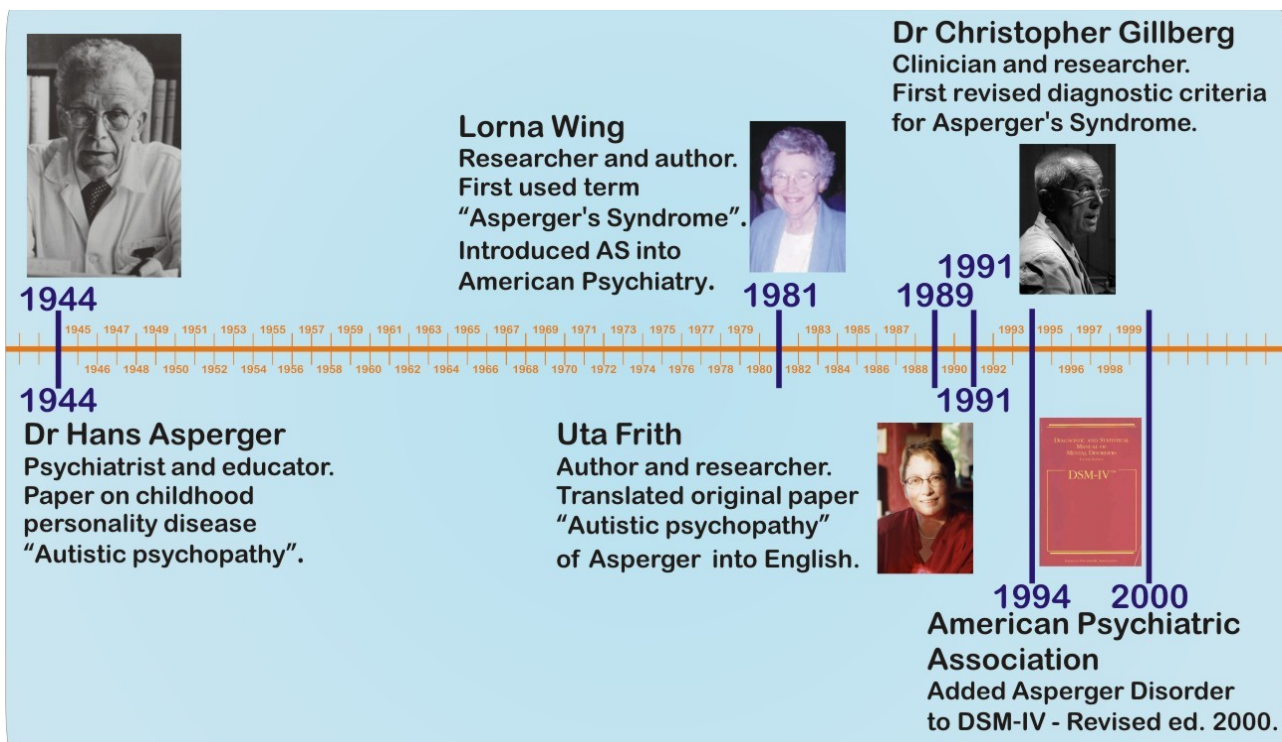
Hans Asperger, was a Viennese psychiatrist and educator, who first described the syndrome in 1944. Asperger (in Smith Myles, et al., 2005: 9) described the characteristics of children that he termed as having 'autism psychopathy,' in the following way:

> The children I will present all have in common a fundamental disturbance which manifests itself in their physical appearance, expressive functions and, indeed, their whole behaviour.

It was only after Asperger's death in 1980 that Wing (1981), first used the term 'AS', to provide a new diagnostic category within the autism spectrum. She stated that Asperger (1944) described many facets of behaviours of children with this syndrome and yet did not explicitly define the syndrome.

However, Wing (1981: 115 - 130) extended Asperger's description and compiled the following characteristics of AS children:

- the children were socially odd, behaved inappropriately and emotionally detached from others;
- they were egocentric and highly sensitive to any perceived criticism, while oblivious to others people's feelings;
- they had good grammar and extensive vocabularies. Their speech was fluent, but long-winded, literal and pedantic;
- they had poor non-verbal communication, monotonous and peculiar vocal intonation;
- they had circumscribed interests in specific subjects, including collecting objects or facts connected with these interests;
- although most of the affected children had intelligence in the normal or superior range, they had difficulty in learning conventional school work;
- they were capable of producing remarkably original ideas and had skills connected with their special interests;
- motor-coordination and organisation of movement was generally poor, although some would perform well in a special interest, like playing a musical instrument; and
- these children conspicuously lacked common sense.

In 1988, an international conference was held in London, to explore AS as one of the spectrum disorders. The result of this conference was the publication of the first diagnostic criteria (Gillberg & Gillberg, 1989, revised by Gillberg, 1991). This table is described in Table 1.2, on page 11. In the same year, 1991, the original paper of Asperger, *Autistic Psychopathy* was translated into English by Frith (1991).

In 1994, the American Psychiatric Association published the fourth edition of the Diagnostic and Strategic Manual of Mental Disorders (DSM-IV). For the first time Asperger Disorder was added as one of the Pervasive Developmental Disorders.

Subsequent to this first publication of the DSM-IV in 1994, the manual was piloted and revised. Attwood (2007: 53) mentions that the revised DSM-IV (2000) diagnostic criterion is to-date still considered 'work-in-progress'. The American Psychiatric Association states that the release of the approved DSM-V is expected in May 2012.

2.5 CHARACTERISTICS OF LEARNERS EXPERIENCING AS

This study will focus on the characteristic criteria identified by Gillberg (1991). I agree with Attwood (2007: 36), when he mentions that many clinicians, including himself, prefer the criteria Gillberg has referred to, as it most closely resembles the original description used by Hans Asperger.

The characteristics of AS as stated by Gillberg (1991: 631 - 638), refers to six criteria (as described in Table 1.2, on page 11), and briefly these are: 1) social impairment, 2) narrow interests, 3) compulsive need for introducing routines and interest, 4) speech and language peculiarities, 5) non-verbal communication problems, and 6) motor clumsiness.

I will provide a short description of the above six criteria and will then proceed to investigate, in detail, the importance of sensory processing. Although many researchers allude to sensory processing as an important criterion for learners experiencing AS, a gap exists, in that this knowledge of sensory processing has not been officially included as diagnostic criteria in the DSM-IV. Attwood (2007:10) has stated that more research has to be done, particularly into the aspects of sensory processing and has recently published a book where he refers to sensory processing as a characteristic.

2.5.1 Social impairments and non-verbal communication problems

In the diagnostic criterion of Gillberg (1991: 631 - 638) we find that learners experiencing AS will show at least four of the following 'egocentricities'. These learners will have difficulty interacting with their peers, show indifference to contacts, difficulty with interpreting social cues and display socially and emotionally inappropriate behaviour. They could also show limited use of gestures, facial expression and display awkward body language and a stiff gaze.

The diagnostic criteria is confirmed by Sohn & Grayson (2005: 3) and Klin et al., (2006: 125), that individuals with AS experience difficulties with basic elements of interaction, which include eye-contact, facial expressions, body language, conversational turn-taking and matching conversational and non-verbal responses to the interaction.

According to Attwood (1998, 2007), he can identify with these characteristics and mentions that it impacts on how AS learners perceive their world. He sees these unique character traits as having a major influence on AS learners' learning and adaptability in their school environment. He states that these learners find it difficult to pick up on social cues, and may have difficulty using and interpreting non-verbal communication such as facial expressions, body language and gestures. This makes it difficult for them to know what acceptable social behaviour entails and this often results in well-meaning remarks that may offend others. This causes them to be isolated, becoming tense and distressed as they try and cope with approaches and social demands from their peers.

2.5.2 Narrow interests and compulsive need for introducing routines and interests

Although learners experiencing AS have difficulties with interpersonal relationships, some of them have a remarkable ability in a chosen area of expertise (Attwood, 2007: 172).

This is also one of the characteristics that Asperger (in Attwood, 2007: 172) identified when he stated:

> Another autistic child had specialised technology interests and knew an incredible amount about complex machinery. He acquired this knowledge through questioning, which was impossible to fend off, and also to a great degree through his observation.

Gillberg (1991: 631), described this restricted and repetitive interest as being abnormally intense or focussed. They may stick to inflexible routines, and preoccupy themselves with parts of objects to the exclusion of other activities. They will also display more rote learning than learning for meaning. This, according to Gillberg (1991) affects all aspects of their everyday life, which affects others.

The pursuit of specific interests is confirmed by both Bashe & Kirby (2001) and Klin, et al. (2006), as one of the most striking features of AS. They mention that individuals experiencing AS may collect volumes of detailed information on a relatively narrow topic such as 'dinosaurs' or 'trains', without having a genuine understanding of the broader topic. Although these interests may change from time to time, they typically become more narrowly focussed, and often dominate social interaction so much so that it can become overwhelming and immerse everyone around them.

2.5.3   Speech and language peculiarities

Gillberg (1991: 631-638), mentions that learners experiencing AS will express some of the following language peculiarities: delayed speech development, superficially perfect expressive language, formal pedantic language, odd prosody, peculiar voice characteristics and impairment of comprehension, including misinterpretation of literal and implied meaning.

People experiencing AS have a highly pedantic way of speaking and will use language far more formally than needed in conversation (Bashe & Kirby, 2001: 45). Learners experiencing AS also tend to make literal interpretations of what other people say, being greatly confused by idioms, irony, figures of speech, innuendo and especially sarcasm. Learners experiencing AS may have difficulty with problem-solving, analysing or synthesising information, and understanding language beyond the literal level. Attwood (2007: 204) comments that as they often miss the subtle nuanced messages, expressed by facial expressions, eye contact and body language, their behaviour may be interpreted as being egotistical, selfish and uncaring.

2.5.4 Motor clumsiness

Research conducted by Ozonoff, et al. (2007) on motor skills in learners experiencing high functioning AS, also confirmed that these learners show uneven fine and gross-motor skills and a lack of cooperativeness in group activities and play. Attwood (2007: 261) agrees that these characteristics will affect the child's ability to use adventure playground equipment and his competence in activities in the gymnasium. Asperger (in Attwood, 2007: 259) stated that:

> clumsiness was particularly well demonstrated during PE lessons. He was never able to swing with the rhythm of the group. His movements never unfolded naturally and spontaneously – and therefore pleasingly – from the proper coordination of the system.

In the AS criteria of Gillberg (1991: 631 - 638), he does not elaborate on motor clumsiness, as he only refers to 'poor performance in neuro-developmental test'. Yet, Sohn & Grayson (2005: 4) are of the opinion that many learners that experience AS have difficulty with both

gross and fine-motor skills. They mention that the difficulty is not just the task itself, but the motor planning involved in completing the task. This influences the ability and skill of riding a bike, throwing and catching a ball and the correct handwriting skill.

The following discussion defines sensory processing, and explains when it can become a disorder. I will conclude by discussing how sensory processing pertains to learners experiencing AS.

2.6 THE IMPACT OF SENSORY PROCESSING ON LEARNERS EXPERIENCING AS

Kranowitz (2005: 55) defines sensory processing as: "the neurological procedure of organizing the information we take in from our bodies and the world around us for use in daily life". Smith Myles, et al. (2005: 1) agree and describe sensory processing as "a sensation that is what we can see, hear, feel, smell, and taste, gives us information about the environment around us and about ourselves. It helps us understand the world and how to act on and within it". They state that our central nervous system helps regard, disregard, seek out, or avoid sensation to maintain or increase feelings of comfort, excitement and positive interaction with people and objects. These results of our actions and associated feelings to sensory stimuli contribute to our sense of well-being, whether positive or negative. Sensory integration, making sense of all the sensations we experience, is described by Ayres (2005: 5) as an unconscious process of the brain that organises information detected by our senses, gives meaning to the information and helps us respond and react in a purposeful manner. This process, according to Ayres (2005), forms the underlying foundation for academic learning and social behaviour.

It is mentioned by Kranowitz (2005: 54), that to have a better understanding of sensory processing, it is important to take note that the senses receive information from both inside and outside of our bodies. The pictorial image, Figure 2.3, on page 38, will demonstrate the position of our senses. They are:

The external senses:

- *the tactile sense*, providing information about touch, which we receive through our skin;

- *the olfactory and gustatory senses*, providing information about smell and taste, through contact with the nose and mouth; and

- *visual and auditory senses*, providing information about sight and sound, that comes from the environment.

The internal senses:

- vestibular sense, providing information about body movement through space and balance; and

- *the proprioceptive sense,* gives information about body parts and body position and movement.

The importance of tactile, vestibular and proprioceptive senses, according to Ayres (2005: 8), lays the foundation for a child's healthy development.

Figure 2.3 The position of the bodies' senses
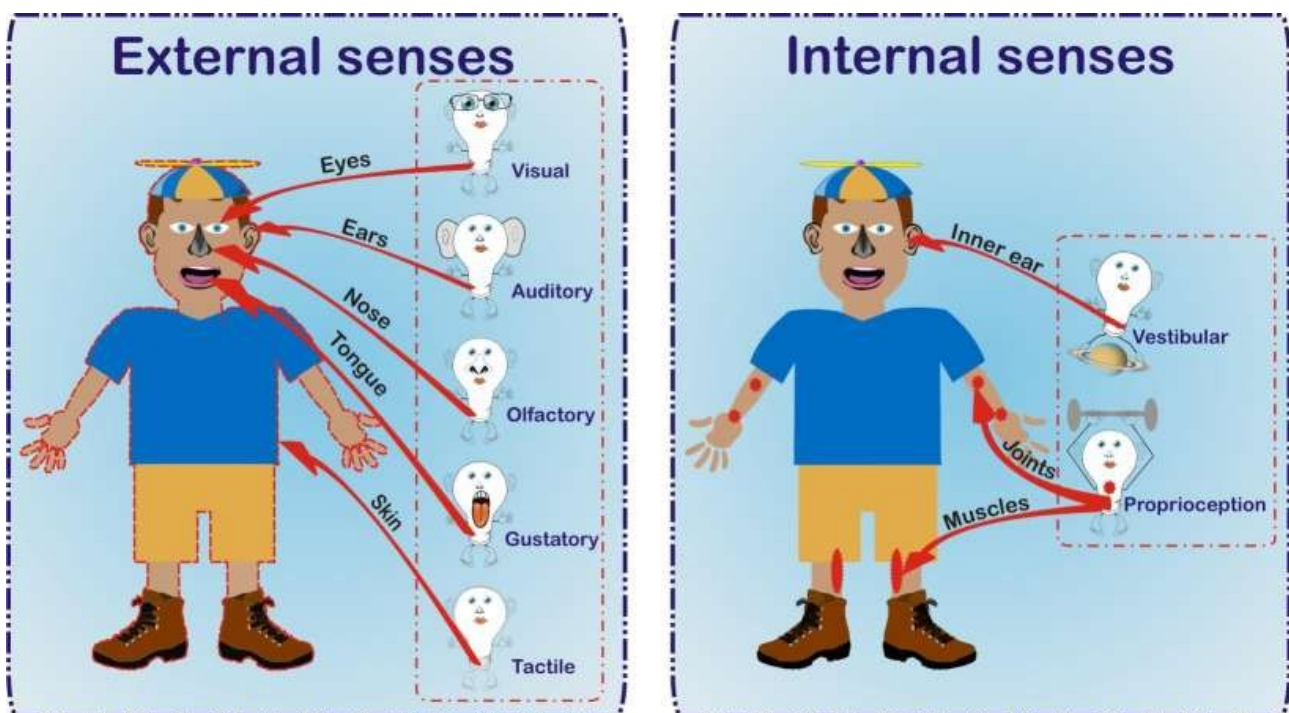
Kranowitz (2005: 68) argues that ineffective sensory processing happens when the brain has difficulty in the way it takes in and organises sensory information, in one or more of the sensory areas, or at any point in the sensory integration process. This can cause a person to have problems interacting effectively in the every day environment. She mentions that sensory stimulation may cause difficulty in one's movement, emotions,

attention, or adaptive responses. Ineffective sensory processing can limit the learning possibilities and effective interaction with other peers and the immediate environment.

Asperger (in Frith, 1991) made mention of the following characteristics: stereotypical play, odd responses to sensory stimuli, including over-sensitivity to sound, spinning objects, stereotypical body movements, destructiveness and restlessness. Attwood (2007), argued that these characteristics, according to Asperger (1944), prevented learners from assimilating the automatic routines of every day life. Wing (1998: 13) concurs with Asperger's findings, when she mentions that children with autism are frequently reported to exhibit behaviours associated with sensory sensitivity (e.g. covering ears to loud, unexpected sounds; restricted food preferences), sensory under-responsibility (e.g. failure to orient to name or react to pain) or sensory seeking (e.g. rocking, hand flapping, noise making).

The following discussion will have the following headings: tactile, vestibular, proprioception, visual, auditory, gustatory and olfactory processing associated with AS learners. To conclude each section, a table will present an overview of how some researchers (Smith Myles, 2005 et al., Kranowitz, 2005, Attwood, 2007), view the impact these senses can have on the learning and development of individuals experiencing AS.

2.6.1 Tactile sensory processing

Smith Myles, et al. (2005: 23) mention that tactile sensitivity that learners diagnosed with AS are experiencing can vary between hyper-sensitive (over-sensitive) or hypo-sensitive (under-sensitive) or fall anywhere between the continuum. Asperger (1944), however mostly observed hyper-sensitivity behaviour towards touch. He mentioned: "Many children had an abnormally strong dislike to particular tactile sensations. They could not tolerate the roughness of new shirts or of mended socks". This was confirmed by Attwood (2007: 279), but he stated that it had to do with the degree of pressure or the touching of particular parts of the body. He mentioned that they may fear the close proximity of other children due to the risk of accidental or unexpected touch, or the gesture of affection may be perceived as too intense a sensation. At school, learners experiencing AS, may find the glue on their hands offensive, or complain of the other learners sitting too close, or by being hypo-sensitive, will constantly touch objects or people around them to orientate themselves disregarding the personal space of others (Smith Myles, et al., 2005: 27).

Table: 2.3 Impact of tactile sensitivities on learning and development of AS learners

Areas of learning and development impacted by tactile sensitivity	Outcome of experiencing tactile sensitivity in learning and development
Concept of space.	As they mostly rely on touch to explore the environment, they often get too close to others without regard for other's personal space.
Body concept, gross and fine motor skills.	Feels uncomfortable using body in environment. Avoidance of physical participation or most activities that involve touch sensations. Results in poor gross and motor skills.
Visual discrimination. (Looks but does not internalise how it feels).	As they do not touch some items they cannot form a basic knowledge of how items feel.
Academic learning.	As they miss out on hands-on manipulation of objects, they miss out on learning of new skills – like for example cutting and acquiring problem-solving skills.
Social and emotional development.	Avoidance of activities often causes anxiety and difficulty making friends. This can lead to bullying and teasing.

2.6.2 Vestibular sensory processing

The vestibular system refers to structures within the inner ear that detects movement and changes in the position of the head (Hatch-Rasmussen, 1995). According to Smith Myles, et al. (2005: 28) the vestibular system is involved in the movement, posture, vision, balance and coordination of both sides of the body. Asperger (1944) noted that the children he was observing displayed unnatural movements that were not spontaneous during PE. Smith Myles, et al. (2005: 28) view sport, gym and gross-motor games to be a problematic time for learners diagnosed with AS. Attwood (2007: 260) confirms this, when he mentions that learners experiencing AS have a low tolerance for activities that involve movement. For an AS learner that displays vestibular sensitivity, games involving movement causes them to often opt out and not to participate, and when forced, they will appear to be ill. Some tasks required in the classroom can also cause a challenge. For example copying from the board, or positioning the body to work in a confined space. When AS learners experience vestibular hypo-sensitivity during an activity, they may appear clumsy and will find it difficult to know when to start and stop during movement. This results in bumping into objects and running into peers.

Table: 2.4 Impact of vestibular sensitivities on learning and development of AS learners

Areas of learning and development impacted by vestibular sensitivity	Outcome of experiencing vestibular sensitivity in learning and development
Movement and balance.	Their movements are often un-coordinated and awkward. Results in bumping into peers or objects.
Muscle tone.	Due to low muscle tone they may have difficulty turning knobs, holding writing acquirement correctly and may tire easily.
Bilateral coordination.	Difficulty using both sides of his/her body together. Find it difficult to copy from the board.
Social and emotional.	Often develop a low self-esteem and avoids activities.

2.6.3   Proprioceptive sensory processing

The proprioceptive system, according to Hatch-Rasmussen (1995), refers to the components of muscles, joints and tendons that provide a person with subconscious awareness of the body. Smith Myles, et al. (2005: 31) note that the muscles and joints send messages to help us move, sit, hold an item, and balance. This awareness allows us to perform everyday movement activities without thinking, or focussing our eye on what we are doing. Attwood (2007: 270) confirms these statements and mentions that there is an impression of clumsiness in at least sixty per cent of children experiencing AS, but not all individuals experience the same specific expression of movement disturbances. He argues that poor planning for movement and slower mental preparation time may be a more precise description than simply being clumsy.

Table: 2.5 Impact of proprioceptive sensitivities on learning and development of AS learners

Areas of learning and development impacted by proprioceptive sensitivity	Outcome of experiencing proprioceptive sensitivity in learning and development
Body awareness.	Not aware of his body position and knowledge of his body parts.
Gross and fine motor control.	Difficulty in grasping an object, or affects movement and manipulating of objects during balls games.
Postural stability.	Lacks stability to make fundamental postural adjustments for everyday skills for example adjusting body to sit, stand or move.
Emotional and Social development.	Not comfortable with his own body. Avoids activities.

2.6.4   Visual sensory processing

According to Attwood (2007: 291) sensitivity to particular levels of illumination of colour, or distortion of visual perception occurs in about one in five children experiencing AS. Smith Myles, et al. (2005: 32) mentions that visual sensory processing can take many forms. They explain that often they cannot see an item that is right in front of their eyes, yet they can often find a minute difference in some game that they are very fond of. Smith Myles, et al. (2005) feel that the discrepancy lies in the fact that when the motivation is high and the concentration is intense, they can notice the finest details. This focus often does not last for a long period of time. This discrepancy often is seen where, for example, a learner will focus and draw a train (his special interest) with precise detail, yet when it comes to drawing a picture relating to a focus in class, their drawing will appear immature. Both Smith Myles, et al. (2005: 33) and Attwood (2007: 285) agree that learners experiencing AS often display visual over-sensitivity. Both mention that the effect of bright, flickering or reflective light experiences for these learners can be very confusing and irritating. Attwood (2007: 286) however specifies that not all visual experiences are disturbing. For some learners experiencing AS, visual symmetry can provide them with intense pleasure. This can be, for example, the parallel lines and sleepers of a railway track, or the electrical pylons in a rural landscape.

Table: 2.6 Impact of visual sensitivities on learning and development of AS learners

Areas of learning and development impacted by visual sensitivity	Outcome of experiencing visual sensitivity in learning and development
Eye-hand coordination.	Difficulty staying in lines, and keep appropriate spaces between characters.
Concentration.	Battle to stay focussed if there are external visual distractions, like a flickering light or too much sunlight.
Emotional and social development.	Often distressed and experiences anxiety if too much visual stimulation. Avoidance of areas can result in inclusion and teasing by peers.

2.6.5   Auditory sensitivity processing

In a study done on sensory issues with AS children, Smith Myles, et al. (2005: 288) noted that these children have a particularly difficult time capturing auditory information during the exact time when it is available. This often means that AS learners identify only with the

part they were able to capture and thus often misunderstand the overall picture. Attwood (2007: 275) mentions that there are three types of noise that are perceived as being unpleasant for people experiencing AS. The first is sudden unexpected noises for example a dog barking, a bell ringing, and even the clicking of a pen. The second is high-pitched and continuous sounds, for example, small electrical equipment or the vacuum cleaner or food processor. The third is the confusing multiple sounds experienced in a busy shopping mall or noisy social gatherings. Smith Myles, et al. (2005: 34) state that AS learners can react in a *fright, flight and fight* response, for example, they may respond to a fire siren going off, by jumping up and running away while covering their ears. They also mention that individuals experiencing AS have hyper-sensitivity to 'small soft' noises. This can range from the ticking of a clock to the noise of a fork on a glass plate and results in learners being only able to concentrate on that and nothing else. Children can also be hypo-sensitive to sound. They often do not seem to respond, even if there is no background noise. The reason they give for this non-response is that these learners are deep in thought about their latest obsession (Smith Myles, et al., 2005: 35).

Table: 2.7 Impact of auditory sensitivities on learning and development of AS learners

Areas of learning and development impacted by auditory sensitivity	Outcome of experiencing auditory sensitivity in learning and development
Focus and concentration.	Battles to focus because of external noises, and even soft continuous noises can cause a distraction.
Avoidance.	Will stay clear of potential noise disturbances and miss out on activities.
Social, emotional.	Causes anxiety as educators and peers find it difficult to empathise, as certain sounds do not appear distracting to them.

2.6.6   Gustatory sensory processing

Smith Myles, et al. (2005: 36) mention that Asperger (in Boeree 2006: 80) found during his observation with children experiencing AS, that they display an insurmountable dislike of vegetables, fruit and dairy products. Attwood (2007: 282) agreed that individuals with AS are very picky eaters and often cannot tolerate the texture of certain food in their mouths. This is of great concern to parents as this may result in poor nutrition. Some parents complain that even the taste of toothpaste can cause their child anxiety (Smith Myles, et al., 2005: 37).

2.6.7 Olfactory sensory problems

Smell seems to be a problem for many children who experience AS. Smith Myles, et al. (2005: 37) states that our olfactory system is bombarded with smells in the environment, and that AS learners have to deal with many diverse smells. At school, for example, these learners have to cope with smells associated with glue, paints, cleaning materials and odours from food. Attwood (2007: 284) feels that this sensitivity to certain smells can result in the person becoming nauseous, or simply avoiding going near areas where they know they may encounter certain smells.

It is argued by Attwood (2007: 284) that a heightened sense of smell can have some advantages. They may become aware of something burning before anyone else smells the smoke, or can also smell that food is off that could make a person sick. He even mentions that with this heightened sense of smell individuals have been known to become wine connoisseurs.

Table: 2.8 Impact of gustatory and olfactory sensitivities on learning and development of AS learners

Areas of learning and development impacted by olfactory and gustatory sensitivity	Outcome of experiencing olfactory and gustatory sensitivity in learning and development
Learning environment and participation.	Environment filled with different smells and experiences to taste certain textures of food, can cause anxiety and avoidance of learning experiences.
Academic learning excursions.	Often difficulty with strange smells and tastes that they are exposed too.

Research conducted by Dunn (1999) has shown that the sensory system has a negative impact on the behaviour of children and youth experiencing AS. Smith Myles, et al. (2005: 20) affirm that to have a better understanding of this statement one needs to keep in mind that learners experiencing AS have:

- trouble growing up and making friends;
- they are sensitive to criticism;
- have poor frustration and tolerance, and cry easily;
- they cannot tolerate change of plans or routines;
- often battle to complete tasks; and
- cannot perceive body language correctly.

Now to add sensory issues to the problem, one can rightfully expect learners experiencing AS to have difficulty in functioning optimally in a mainstream school environment without additional understanding and support (Smith Myles et al., 2005: 41).

2.7   CHAPTER SUMMARY

In this chapter a range of theories on learning and development have been explored and discussed. Theories of Piaget, Vygotsky, Feuerstein and Erikson were discussed in relation to the learning and development of Grade R learners. This was followed by a discussion on the most recent literature on Inclusive Education within South Africa's OBE system, the characteristics of learners experiencing AS, sensory issues relating to AS learners, as well as the impact this can have on their learning and development.

In Chapter 3, the research design, approach and the implementation of the data collection plan will be discussed.

CHAPTER 3

3. RESEARCH DESIGN AND METHODOLOGY

Chapter 3 introduces the research design, and the research question. The research approach, methodology and design, analysis and ethical considerations are discussed. A chapter summary concludes this chapter.

The purpose of this study is to explore the impact that sensory processing had on the learning and development of Grade R learners that experience AS. Cohen, et al. (2008: 78) state that a research design is governed by the notion of 'fitness for purpose'. The purpose of the research determines the methodology and design of the research. According to Wiersma & Jurs (2006: 83) a good research design needs to assist in understanding and interpreting the results of the study and ensures that the researcher obtains usable results. Two purposes are identified. The first is to provide answers to a specific research question. The second purpose is to control the variance. This means being able to explain what is causing it, at least to the point that results can be interpreted with confidence.

3.1 THE RESEARCH QUESTION

The key focus question in this study is:

"What is the impact of sensory processing difficulties on the learning and development of two learners experiencing AS in Grade R?"

The research seeks answers to two sub-questions:

- What are the sensory processing difficulties of learners experiencing AS within a mainstream Grade R class environment? and

- What impact does sensory processing difficulties have on the learning and development of learners experiencing AS in a Grade R class environment?

3.2 THE RESEARCH APPROACH

This is an ethnographic study, which according to Henning (2007: 42), is a way of studying a group of people's way of life. This approach stems from social participation and is termed as 'participatory observation'. The current study is grounded in two qualitative instrumental case studies, conducted within an interpretive research paradigm. The instruments chosen include interviews and observations.

3.2.1 Case study as an empirical inquiry

Yin (2003: 18 - 20) defines case study research as comprising of an all-encompassing method covering the logic design, data collection techniques, and specific approaches to data analysis. It is a preferred strategy when 'how' and 'why' questions are posed, the researcher has little or no control over events, and the focus is on a contemporary phenomenon within some real life context. As a case study is an empirical inquiry, it:

- investigates a contemporary phenomenon in depth and within its real life context, especially when boundaries between phenomenon and context are clearly evident;
- copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result;
- relies on multiple sources of evidence, with data needing to converge in a triangulating fashion and as other results;
- benefits from prior development of theoretical propositions to guide data collection and analysis; and
- can cover more than one case and draw a single set of 'cross-case' conclusions.

According to Yin (2003: 2) there are six steps that need to be followed when using case study as a method of research: They are to:

- determine and define the research questions;
- select case/s and determine the data gathering and analysis techniques;
- prepare to collect data;
- collect data in the field;
- evaluate and analyse the data; and
- prepare the report.

Cohen et al., (2008: 256 – 257), argues that there are advantages for using a case study, but that a case study can also open itself up to some weaknesses. The following section will discuss this statement in more detail.

3.2.1.1 Advantages for using a case study

- The data is strong in reality, down to earth and attention holding;

- It is in harmony with the researcher's experience and thus a natural basis for generalisation about instances that occurred in the research environment; and

- It offers support to various and alternative interpretations and allows the readers to judge the implications of the study for themselves.

3.2.1.2 Disadvantages for using a case study

- The results may not be generalisable except where other researchers see their application;

- They are not easily open to cross-checking; hence they may be selective, biased, personal and subjective; and

- They are prone to problems of observer bias, despite the attempts made to address reflexivity.

The current study is about using the case study method to conduct an in-depth, investigation into examining two learners experiencing AS in a mainstream Grade R classroom environment. This method provided me with a systematic way of collecting data, assisted in the analysing of the information and reporting on the results. This in turn provided me with a sharpened understanding of why these two learners reacted in certain instances the way they did, and what impact these reactions can have on their learning and development.

3.2.2 Thoroughness in approach

According to Cohen et al., (2008: 133) there are many types of reliability and validity. They argue that validity can be addressed through honesty, depth, richness and scope of the data achieved, the participants approached, the extent of triangulation, and the objectivity of the researcher. Reliability is on the other hand a synonym of dependability, consistency and reputability over time, over instruments and over respondents.

I used multi-methods of data collection in the current study, namely interviews and observations. I attempted to map out, or explain more fully the richness and complexity of human behaviour of learners experiencing AS, by studying it from more than one standpoint. Henning (2007: 147) argues that if the outcome of the interview survey corresponded with the observation study of the same phenomenon, the researcher would be more confident of the findings. By using observations and interviews as my data instruments, I hoped that the two sets of data would help me to ensure consistency, reliability and validity.

The focus of the three interviews was on establishing the educational difficulties caused from the inappropriate response to sensory processing expressed by the learners experiencing AS. A copy of the original interview schedule and questions are available in Appendix 3, on page 112, and Appendix 4, on page 121. During my data analysis I transcribed all the interviews and looked for common themes that arose and then compared them.

Data from the observations were gathered through making continuous notes on a pre-planned observation schedule. Coding procedures, involved categories, labelling and naming of various aspects around the topic of sensory factors, was used. 'Coding', according to Henning (2007: 131) represents the operations by which data is broken down, conceptualised, and put together in a new way. This allowed me to work systematically, while comparing the data and grouping it together under the same conceptual label.

3.3 METHODOLOGY AND DESIGN

Methodology refers to the coherent group of methods that complement one another and that have the 'goodness to fit' to deliver data and findings that will reflect the research question and suit the research purpose (Henning, 2007: 36). Design logic shows how well the topic, the field and theories are understood and if the literature review researched, gives evidence of this knowledge (Henning, 2007: 33).

The approach used in this thesis was purely qualitative using open-ended questions in the interviews and in the observation schedules. This approach was used to not only find out *what* happened, but also *how* it happened and, more importantly *why* it happened the way it did (Henning, 2007: 3).

Before the interviews and observations were scheduled, the intended interview questions and observation schedule were piloted. Van Teijlingen & Hundley (2001) elaborate that the term 'pilot study' refers to mini versions of a full-scale study, as well as the specific pre-testing of a particular research instrument such as a questionnaire of an interview schedule. By trialling these interview questions with an independent Grade R educator, I could judge if the questions were clear and concise. She also screened the observation schedule for consistency and reliability.

3.3.1 Some 'findings' of piloting the interview questions and observation schedules

- Some of the interview questions elicited answers that could either have been answered in a positive or negative manner. As some of the questions could be answered with just a 'Yes or a 'No', some probing questions had to be added so the respondents would elaborate on their answers.
- On reflection, during the piloting of the interview questions, I realised I was expecting only negative responses.
- The observation schedule had too many similar statements to direct the researcher during the observation.

After these changes were implemented, I was assured by the independent educator, that was part of the pilot study, that to the best of her ability, there was no evidence in the

interview questions of vague items, leading or negatively phrased questions. Nor did I elicit any unnecessary information about the learners.

In the following section, I will explain the discursive orientated approach used in the interviews. I will then outline the advantages and disadvantages of using interviews as a data collection method.

3.3.2   Interviews using discursive oriented approach

Henning (2007: 79) describes interviews as: "communicative events aimed at finding what participants think, know and feel. Researchers are co-constructors of meaning and therefore are interested in the line of thought and want to pursue it". As I was using a discursive oriented approach to interviewing, I used the information that I gathered, while socially interacting and communicating with the respondents to find out what they knew, thought, and felt about learners experiencing AS. This information assisted me in gaining a better understanding of how these learners perceived their world through their senses.

Interviews were scheduled independently with the two educators of the AS learners in the first week of September 2008. In the first week of October 2008 I scheduled an interview with a psychologist who works with learners that experience AS. These semi - structured, 'face-to-face' interviews were conducted after hours, in the educators' classrooms and in the psychologist's convergence room.

The interviews with the two educators were scheduled and conducted in the medium of English, as that was the language of instruction in their classrooms. Using open-ended questions, the respondents were asked to give their own answers to the questions. Verbal probing questions were provided when necessary. These probing questions were intended to help the respondents think more deeply about the issue at hand and helped guide them to stay focussed on the research topic (Hammell, et al., 2005: 32).

The interview with the psychologist focussed on how she, in a school setting, works with teachers and assists in mediating sensory processing skills. This interview was beneficial to my research as I obtained her clinical findings on how sensory processing influences the learning and development of these learners and provided me with understanding, knowledge and insight on how these learners were functioning intellectually and

perceptually. By using open-ended questions the psychologist gave as much information as she felt was relevant and allowed me to respond to unexpected information and introduced new unanticipated questions into the interview.

3.3.2.1 Advantages of using a discursive oriented approach in this study

- This approach enabled me to establish rapport with the respondent;
- I was able to observe as well as to listen;
- An environment was created which enabled me to ask more complex questions;
- I could use open-ended questions that provided no structure for an answer;
- I could take note of relevant information not covered by a question; and
- This approach allowed free responses and different opinions from respondents.

3.3.2.2 Disadvantages of using interviews within the discursive oriented approach

According to Cohen et al., (2008: 363 - 364) there are several disadvantages that can arise during the actual conduct of an interview. They argue that one has to make sure to take the following into account:

- External distractions (e.g. telephone calls, people knocking on the door);
- Avoid using embarrassing or awkward questions;
- Jumping from one topic to the other;
- Giving advice and opinions rather than listening;
- Summarising too easily or closing off an interview too soon;
- Being too superficial; and
- Handling of too sensitive or personal matters.

3.3.2.3 Disadvantages for using interviews for this study

I concur with Cohen et al., (2008: 364), as I experienced external distractions at all three interviews that I conducted. At the first school we were forced to relocate to another venue since the renovation noises disrupted the flow of our conversation. At the second school the educator, who was being interviewed, had to attend to an urgent business at the time of our arranged interview. I therefore had to wait until she was free and willing to spend

time with me. During the interview with the psychologist we were interrupted by the early arrival of her next patient.

During the interviews I found the following aspects challenging:

- Keeping both the educators focussed on the specific questions;

- Guiding them to only give me information on what they experienced and observed, and not the 'hear say' from other educators;

- Reminding them that they were not on trial and were not to blame for the learner's difficulties;

- Staying focussed and not deviating from the questions;

- Not giving suggestions to assist with problems the learners were experiencing; and

- Keeping the interview with the psychologist within the arranged time slot, as she had so much more information that she could offer.

The next section will focus on using observation to generate data while posing as a participatory observer. To conclude this section the advantages and disadvantages of using the participatory observation approach will be discussed.

3.3.3   Observing as a participatory observer

As a participatory observer I observed two AS learners, while they were involved in real life experiences, in their everyday physical context. Henning (2007: 82) states that: "observation is not just gathering of information, but participating in the actions of people in the research setting and getting to know their ways of doing very well".

Since both these learners experience AS and their performance fluctuated from day-to-day and minute-to-minute, I put aside the whole month of September 2008, to observe both their sensory processing development. I visited each class, one morning a week from the 2nd - 23rd September 2008. Below, Table 3.1, is a schedule of how the observations took place.

Table 3.1 A schedule of the observations that occurred in September 2008.

	Tuesdays	**Wednesdays**	**Time**
Learner one		September 3, 10, 17.	8h30 to 12h30
Learner two	September 9, 16, 23.		8h30 to 12h30
Total days	3 days.	3 days.	4 hours a day 12 hours per learner in total.

Between 8h30 and 12h30, a normal mainstream Grade R class experiences different activities such as morning ring, creative activities, music and movement ring, free play and story time. Within each of these activities the learner would be exposed to the following environments: physical, cultural, social, and group and task environments. Pre-planned focus areas were included in the schedule that focussed on the exposure to sensory processing of the learner, while participating in activities in each of these environments.

3.3.3.1 Advantages of using the participatory observation approach

The advantages of using the participatory observation approach were that it enabled me to gather data on the following:

- The physical setting (e.g. physical environment);
- The human setting (e.g. the cultural and emotional environment of the learner);
- The inter-actional setting (e.g. social environment of learner); and
- The programme setting (e.g. group and task environment).

As participant observer, I could stay with the learners for a long period of time and see how the events evolved over time, observing the dynamics of each and every situation. This gave me a more holistic view of how the learners perceived their worlds.

3.3.3.2 Disadvantages of using observation

Cohen et al., (2008: 411) argues that there are many observation situations that carry risks of bias. Some of these are:

- *Selective attention of observer*: What we see in relation to where we look that are influenced by our own interests and experiences.
- *Reactivity*: The learners, for example, will change their behaviour if they become aware that they are being watched.
- *Attention deficit*: The observer is distracted or looks away and misses an event;
- *Validity of constructs*: Decisions have to be made on what counts as valid evidence for a judgement.
- *Selected data entry*: What we record is sometimes affected by our personal judgement rather than the phenomenon itself.

To protect myself against being biased while doing the observations, I made sure that I was always actively and consciously involved in not only gathering data and making decisions about what to observe, but managing it on many levels. I observed, took notes, and decided when to participate and when to observe. Not only were the learners observed, but notes where made of the environments and other external elements that could have an impact on the outcome of my findings. Personal notes (memos) were written concurrently while I observed.

A copy of my extensive observation list is in Appendix 5, on page 127 – 158. My main focus was to keep the reasoning behind the capturing of data as a priority. Henning (2007: 85) argues that the goal of participatory observation is to render a thick description, filled with discussion and analysis, and rich in explanation and argument.

3.3.4 Sample of the study

For this study I used purposive sampling as a technique of selecting my cases. Cohen, et al. (2008: 114) describe purposive sampling as: "researchers' hand-pick the cases to be included in the sample on the basis of their judgement of their typicality. In this way they build up a sample that is satisfactory to their specific needs".

I intentionally selected two individuals likely to provide me with a greater understanding of the concept of my research focus. I located two learners, aged between 5 and 7 years of age, who had been clinically diagnosed with AS. They were currently attending a Grade R class, in and around the Cape Peninsula.

3.4 DATA ANALYSIS OF THIS STUDY

This study is a qualitative inquiry as the data will be analysed for meanings of the findings, and to find a pattern and a reason for the way in which something happened. Henning, (2007: 127) outlines:

> Data analysis in qualitative research is an ongoing, emerging and iterative or non-linear process. Before you begin an analysis, data are transcribed, which means that text from interviews, observational notes or memos are typed into word-processing documents.

The quality of the research, according to Doug (1997), can be evaluated in terms of trustworthiness, useability and accessibility. Trustworthiness reflects the confidence practitioners can have in research findings; trustworthiness does not question the individual researchers, but how practitioners can know what findings deserve their trust. Useability refers to the practicality of the research-based practices for those who attempt to put them in practice.

During my data analysis, I transcribed all the interviews and looked for common themes that arose and then compared them with my observational data. The information gathered were categorised and interpreted manually. To obtain corroboration and confirmation of my findings, I linked them to the theoretical framework presented in the literature review in Chapter 2.

3.5   ETHICAL CONSIDERATIONS

Written consent to observe the learners in their formal classroom settings was obtained from the principals of the two schools, the educators and the parents. A copy of the consent letter from the WCED and permission letter from the parents were presented to the principals of both schools. Both the consent letters are included in Appendixes 1 and 2, on pages 109 and 110.

Cohen, et al. (2008: 55) states that informed consent requires an explanation and description of several factors which include:

- the purposes, content and procedures;
- benefits that may derive from the research;
- right of withdrawal from the interviews and observations;
- disclosure of alternative procedures that may be advantageous;
- opportunities to ask questions about aspects of the research; and
- letters of acceptance to partake in the research from all parties.

As these learners were too young to give consent themselves, I received written consent letters from both parents. In this letter, a guarantee that all responses would be kept confidential and anonymous was given to both parents. (See Appendix 2, on page 111).To honour this agreement the respondents' names were not used in this thesis. The learners were referred to as 'learner 1' and 'learner 2'. A detailed summary of the findings will be made available to the parents upon completion of this thesis.

3.6   CHAPTER SUMMARY

This chapter has introduced the research design, and the implementation and approach of this design. The research question, research approach, methodology, sample, analysis and ethical considerations were discussed and the literature sources were mentioned in support of the selected design and methodology used. In Chapter 4 the results and analysis of this investigative research will be presented.

CHAPTER 4

4. RESULTS

4.1 INTRODUCTION

The primary aim of this research was to establish the impact of sensory processing difficulties on two learners with Asperger's Syndrome (AS) in the mainstream Grade R school environment. The critical questions were intended to establish what sensory difficulties these learners' experienced and how it influenced their learning and development.

The observation (as a participatory observer) and interview data (open-ended questions) are represented in a pictorial form (Figure: 4.1, on page 60), with an analytical discussion on the trends that emerged.

In Chapter 3 the empirical design was outlined and this chapter, the empirical results are presented in accordance with the aim of the study.

4.2 BACKGROUND TO THE ANALYSIS OF THE RESULTS

I observed two learners in their regular classroom settings to get to know their particular method of interacting with their immediate environment. The two learners were observed:

- across settings (physical, cultural, social, and group and task);
- how they interacted and responded (interaction and communication); and
- the way they used their senses of tactile, auditory, visual, gustatory, olfactory, vestibular and proprioception in their responses.

These settings as well as the discussion of the findings, will form the basis of the analysis in this chapter.

The data from the interviews with the educators of the two learners and the psychologist will be discussed to add a richer texture to the findings.

4.3   FINDINGS: ANSWERS TO THE TWO RESEARCH QUESTIONS

As presented in Chapter 1, the critical question in this study is:

What is the impact of sensory processing difficulties on the learning and development of two AS learners in Grade R?

The answer to this question is shown by progressively answering the following two sub-questions:

4.3.1   What are the sensory processing difficulties experienced by AS learners within a mainstream Grade R class?

4.3.2   How do sensory processing difficulties influence learning and development of Grade R learners experiencing AS?

4.3.1   The sensory processing difficulties experienced by AS learners within a mainstream Grade R class.

The first sub-question has been analysed according to environments, which include the physical, cultural, social and their group and work task environment. Flowing from the data collected from the observations and the interviews, a pictorial table (Figure 4.1, on page 60), has been designed to show how learners 1 and 2 experienced sensory processing difficulties across all these four environments.

Figure 4.1 Overview of the components of the investigation and it's conceptual framework.

An analytical discussion will follow using the observation data to identify the sensory difficulties learner 1 and 2 experienced within each environment. To ensure the validity of the findings from the observations, the interview data will be incorporated into the discussion. Each of the four environments (physical, cultural, social, and group and task orientation) will now be discussed by juxtaposing them with the data gathered from the observations and interviews.

4.3.1.1 The sensory processing difficulties experienced while interacting in the *physical environment*

To determine the sensory difficulties learners 1 and 2 experienced in their physical environment, five areas were identified. They were tactile hyper-and hypo-sensory difficulties, auditory hyper-sensory difficulties, visual processing difficulty, proprioceptive, and vestibular sensory processing difficulties. Each of these will now be discussed in more detail. Figure 4.1, on page 60, describes each environment pictorially.

4.3.1.1.1 Tactile hyper- and hypo-sensory difficulties

The first area of difficulty identified, was that both learners experienced problems with tactile sensitivity while trying to find their own personal physical space. As they responded differently in a similar physical environment to sensory input, each learner will be discussed individually.

Learner I displayed tactile hypo-sensitivity, as he showed a high need for additional tactile sensation to increase his knowledge of where his body was in the environment. He would constantly touch objects, or his peers to the point of irritation. He would pick up, or rub his hands over any object in his path and often tried to sit or stand too close to his peers. I overheard one learner complaining: "He won't move up and keeps touching me". His educator confirmed this behaviour, when she mentioned that when learner 1 spoke to her, he would pull her face towards him to the point of irritation. Learner 1 also came across as very clumsy, as he constantly ran into furniture or his peers. His educator, confirmed this, when she mentioned that he seems very clumsy and would often bump or run into someone or something, with no regard for personal space.

While observing learner 2, I became aware that he displayed tactile hyper-sensitivity, as he showed actual physical discomfort when engaging with his peers or even with certain objects. He would push and shove other learners away when they got too near him, or accidentally touched him in a group situation. His educator mentioned that he would often make inappropriate and clumsy movements and respond over-sensitively to any physical touch when bumping into his peers.

During the interview, the psychologist stated that "Some learners are very spatially unsure in terms of direction and some uncontrollably clumsy and not very co-ordinated. Some AS learners can be very distractable and tactile defensive". Her statement confirmed that learners with AS can have tactile sensory difficulties when it comes to their own personal space in their physical environment.

4.3.1.1.2 Auditory hyper-sensory difficulties

The second observation was that both learners experienced auditory hyper-sensory difficulties in that they became upset and stressed with loud, unexpected or continuous noises - that did not seem to bother any of the other learners in the class. Both learners experienced hyper-sensitivity to auditory stimuli, but responded differently to the input. This will be explained in more detail below.

Learner 1 could not process some sounds that was not just loud, but had a high pitch. This became evident, when during a singing presentation with a guitar, he reacted by moving aside and putting his hands over his ears. He displayed a similar response when he walked around covering his ear for the duration of a thunderstorm, as he could not process the noise of the thunder. His educator re-affirmed this, when she mentioned that learner 1 often responded negatively to loud noises, like certain music, or thunder. She further confirmed his response of putting his hands over his ears, or rocking and making his own noises to block out unwanted sounds. She mentioned that on outings, such as to the fire station, or police station, they had to be very sensitive to the learner's sensory processing needs.

I noticed that learner 2, while experiencing auditory hyper-sensitivity, displayed a different response to certain auditory sensory stimuli. He found the noise of a squeaking wheelbarrow (outside the window) very distracting. He kept referring to the sound outside of the window and he could not focus on what was happening inside the classroom. His

educator mentioned that he was very "tuned into" any noises that he feels did not belong in his environment.

I gained a better understanding of why learners 1 and 2 showed these responses, from the psychologist's explanation of how learners with AS can be hyper- or hypo-sensitive to sound. Depending on the type of stimuli they are trying to process, they can get very anxious, nervous and lose focus when they experience certain sounds. It is often not what they hear that is causing the problem, but the combination of volume, tone, pitch, rhythm and sequence of the sound.

4.3.1.1.3 Visual processing difficulties

The third sensory processing difficulty – visual processing difficulty – was noted when learner 1 showed a tendency to be very visually sensitive to physical movement around him. During a group discussion he noticed that the florescent light above was flickering - even though the other learners were made aware of this, it did not bother or distract them. He could not focus on anything else and would constantly remind the educator of this distraction. He showed a similar response during an outside activity where he refused to sit in the mild sunlight, as he complained that the light, that did not seem to bother any of his peers, hurt his eyes.

While observing learner 2, I looked for similar responses in behaviour towards visual sensitivity, but he did not show any discomfort regarding extra visual stimuli that were already present before he arrived. What I did notice was his response to visitors who entered the classroom. He responded to this added visual change in the environment by verbally announcing that they did not belong in his class and that he did not want to see them.

To further understand this discrepancy in responses to visual processing, between the two learners, it was interesting to note that the psychologist mentioned that the learners with AS cannot cope with sudden physical changes in their environment and added visual stimuli can cause additional distress.

4.3.1.1.4 Proprioceptive and vestibular sensory difficulties

The fourth sensory processing difficulties - proprioceptive and vestibular sensory difficulties - were often experienced simultaneously. I noticed that both learners displayed sensory processing difficulty with regard to their proprioceptive and vestibular sensory system. These sensory systems control the messages the muscles and joints send, to help one move, sit, hold items and balance. This will now be described with reference to learner 1 and 2.

I observed that both learners moved frequently, but in a laboured fashion. They would amble around, rather than walk with meaning. Learner 1 complained that he was tired when expected to do any physical activity or complete an obstacle course. In addition to this I noticed that he mostly walked on his toes. His educator stated that he was very tactile sensitive under his feet and that he walked on his toes, so he did not have to deal with the sensations of the different surfaces he walked on. I, however, believe that proprioceptive sensory stimuli is also important because he would try and walk correctly when reminded, but as soon as he was distracted he would start to walk on his toes again.

Learner 2 also showed both a reluctance and an avoidance of any physical activities. This was observed when he would try and avoid any of the physical and movement activities during group time and he never ventured towards the outside play equipment. Both educators reiterated that these responses were because their learners displayed poor body images and thus found it difficult to identify their left from their right, hold their balance, or sit on a chair without slouching.

The psychologist, when asked about learners with AS and their proprioceptive and vestibular systems, mentioned that learners with AS often have low muscle tone and that the movements that we perform instinctively, often do not come naturally to these learners.

I would like to conclude the above analysis by confirming that, according to my data collection, both learners experienced tactile, auditory, visual, proprioceptive and vestibular sensory difficulties in their physical environment.

A similar discussion on the cultural environment will now follow, where I will use the observation data to identify the sensory difficulties learner 1 and 2 experienced. Further, I

will illustrate the validity of the findings from the observations, by incorporating the interview data into the discussion.

4.3.1.2 The sensory processing difficulties experienced while interacting in the *cultural environment*

Through observing both the learners in their cultural environment, I identified that the two learners displayed the following five sensory processing difficulties: tactile hyper-sensitivity, visual and auditory sensitivity, and olfactory and gustatory sensitivity. An analytical discussion, to substantiate these findings identified, will be clarified in the next section (Refer to Figure 4.1, on page 60).

All the sensory difficulties mentioned above are directly linked to how both learners processed certain rules and regulations, and how they followed through on what was expected of them. These are rules and regulations set up by the educators, which form part of their class' cultural environment. These observations were confirmed by both educators as they agreed that it was not because their learners have a physical hearing defect, or did not understand what was expected of them, but it was often related to processing extra sensory stimuli. These learners were often only trying to process the sensory information the best way they knew how. To clarify these statements, I present the following findings from my observations.

4.3.1.2.1 Tactile hyper-sensitivity

During the first observation in the cultural environment I noted that learner 1 displayed tactile hyper-sensitivity towards participating in toilet routine. He mentioned that the other learners bump him all the time and it makes him cross. When I queried this, his educator responded by saying: "I allow him to choose his own time, as I have noticed that he feels 'boxed in' and then becomes very defensive". Learner 2 displayed a similar response during an outside activity, when he refused to sit on the rubber mat. He complained that he did not like the touch of the rubber on his skin. His educator mentioned that there were certain tactile surfaces he just could not tolerate and she tried to be sensitive to his needs.

Similar scenarios would play themselves out during group discussion time. It would often take both learners up to ten minutes to join their peers and only with positive reinforcement

and guidance would they conform to some of these routines and rules of their surroundings.

4.3.1.2.2 Visual and auditory processing difficulties

The second and third sensory difficulty that were noted were visual and auditory processing difficulties. As these sensory stimuli's were experienced simultaneously in a single situation, I will now discuss how both the learners' responses highlighted their processing difficulties. My observations were as follows:

During a fire safety presentation I observed that learner 1 became very anxious and stressed. His reaction to the visual and auditory stimuli was to settle himself next to the fire exit door, as he was convinced that there was going to be a real fire. His educator could not get him to move away till 'outside time'. A similar response was observed from learner 2 when visiting-students interacted and corresponded with all the learners in the class. He responded by moving away as far as he could, sitting with his back to them, refusing to acknowledge them, or listen to instructions given by them.

4.3.1.2.3 Olfactory and gustatory sensory difficulties

The fourth and fifth sensory difficulties – olfactory and gustatory - were experienced in single situations and will be discussed accordingly. As I noted that both learners came across as very selective eaters and with an over-sensitive sense of smell, I will mention the olfactory and gustatory sensory difficulties learner 1 and 2 were confronted with and their responses towards the situation.

Neither learner 1 nor 2 participated in 'fruit time'. Learner 1 would always first smell the food he consumed and then decide if he was going to eat it. Both educators stated that experiments that involved tasting and unexpected smells were particularly stressful for their learners. For example, the smell of a strong cleaning material would be immediately identified by both these learners as intolerable.

The psychologist, when asked about AS learners with regard to sensory processing impacting on their following rules and regulations, said:

> Often they cannot 'read' into the situation and miss the context. For example the 'large picture' is lost to them. 'Black and white' thinking is common. They also don't often generalise across situations and are inclined to only have their perspective. Like only doing something on their terms.

In conclusion, both learners experienced tactile, auditory, visual and olfactory and gustatory sensory difficulties and this had a direct impact on how they responded and followed through on rules and regulations that formed part of their cultural environment.

In the next section, I will analyse the learners their in the social environment while highlighting the sensory difficulties experienced by both learners and identify their responses towards sensory stimuli with which they were confronted. As per the previous section, I will continue to illustrate the validity of the findings from the observations, by incorporating the interview data into the discussions.

4.3.1.3 The sensory processing difficulties experienced while interacting in the *social environment*

According to my data findings this was where both these learners exhibited all seven sensory processing difficulties. They were tactile sensitivity, auditory sensitivity, visual sensitivity, olfactory sensitivity, gustatory sensitivity, vestibular sensitivity and proprioceptive sensitivity.

In this section I will discuss the learners' socialising skills, juxtaposing this with their sensory processing difficulties which contribute to their lack of appropriate socialising skills.

4.3.1.3.1 Tactile hyper- or hypo-sensitive

It became evident from my observations, that both learners experienced difficulty with social interactions, attributed to being tactile hyper- or hypo-sensitive. To clarify this statement, I will give explanations through the following observations.

I noted that learner 1 very seldom communicated with any of his peers on a social level. When he did engage with his peers, he acted immaturely by being over-sensitive, or over serious. His educator mentioned that according to her, his misinterpretation of body language and facial expression as a result of tactile sensitivity, often resulted in these inappropriate responses. He got very upset and responded by shouting and screaming when one of his peers got paint all over his arm during a fun game that involved a finger painting activity.

Learner 2 chose not to participate in many of the social group settings. This was a concern for his educator, as she mentioned that she believed that because of his inability to cope with some tactile stimuli in his environment, he often isolated himself from the rest of the class. I was made aware of this when I noticed his response after sand was accidentally thrown into his eyes, while playing outside. He reacted by screaming and going hysterical, and it took the assistant educator at least thirty minutes to calm and attend to him.

4.3.1.3.2 Auditory and visual processing difficulties

When I observed both learners' auditory responses during a change in a social setting, it became evident that this was an area where they became very distressed. To clarify this observation, I will state the situations that were observed and give examples.

Learner 1 displayed physical discomfort to the instrumental music presentation at a social gathering. His response to this auditory stimulus was to move into a corner and sit with his hands over his ears. His educator confirmed that certain sound pitches were physically intolerable for him.

During a birthday celebration, where the whole school was involved, learner 2 showed discomfort and tried to move away from all the movement and extra visual and auditory stimulation. He responded by sitting in the ablution block for most of the time. His educator mentioned that any sudden changes and the added auditory and visual stimulation were often too overwhelming for him to comprehend.

While observing a social activity, where the whole class participated in a fantasy game - 'who stole the cookie from the cookie jar?' - learner 1 got very distraught. He could not understand that it was just a game and that there was nobody to blame for the missing

cookie. His educator tried to explain to him that it was only a game, and that there was no real cookie. His response to her explanation was: "But why then ask us if we took it?"

In a similar situation, while listening to the biblical story of Moses and the plagues, learner 1's response to the part where the river was turned to blood, was: "Our water in our taps is not full of blood. We can drink our water:" He could not transfer abstract information of what he heard, saw and knew from life experiences and process it appropriately to everyday concrete experiences.

4.3.1.3.3   Olfactory and gustatory sensory difficulties

I noticed that both learners had the habit of picking up, smelling, and often even trying to taste, nearly everything that they saw. This, according to learner 1's educator was difficult for him to make sense of his surroundings. She mentioned that she would often give him an item beforehand, so he could familiarise himself with it, before it became part of his social environment. In learner 2, this behaviour only occurred once during my observation, when he smelt and bit on new writing utensils (pastel crayons) and decided he could not write with them. According to him, it smelt and tasted funny. He perceived the materials to be unpleasant.

4.3.1.3.4   Vestibular and proprioceptive sensory difficulties

It became apparent that both learners had a specific overriding interest, which did not always fit in with the social interaction of the class. Learner 1 often, when experiencing vestibular or proprioceptive sensory difficulties, would say: "My batteries are running flat", when he felt he could not manage a gross-motor activity. His educator's concern was that his fixation with wires and engines was often seen as an amusement by his peers and that he would often refer to his body as a machine.

Learner 2 had a very strong interest in space and dinosaurs. During free-play he would isolate himself and act out his fantasy game, while ignoring everyone around him. Learner 2's educator mentioned that he had a vast amount of knowledge about his interest and often could not understand why his peers or adults did not want to listen and share in his enthusiasm. Her learner talked about pulling his skin off as he perceived himself as not being a human but a 'Dinosaurs Rex'. The class thought it was funny and yet for him it

was a way to escape an overwhelming auditory and sensory input – this was a very unpleasant experience for him.

The psychologist (when expressing my interest in learners with AS sensory difficulties within a social environment) responded by explaining that most AS learners find it very difficult to distinguish between fantasy and reality. They often only socially interact in situations that are familiar to them or in situations where they will feel comfortable. When forced into a social situation they often act inappropriately, or isolate themselves. This, according to the psychologist, is to try to conceal the fact that they cannot manage the sensory stimulation they are exposed to at that specific time.

My findings show that these two learners have experienced difficulties in all seven sensory processing areas: visual, auditory, tactile, olfactory, gustatory, proprioceptive and vestibular.

In the following section I will analyse the sensory processing difficulties both learners experienced while participating in the group and work environment. As per previous sections the interview data will be incorporated to substantiate and verify the data that was collected during my observations.

4.3.1.4   The sensory processing difficulties experienced while interacting *in* the *group and work environment*

My intention in this section is to indicate that both learners experienced five sensory processing difficulties during group and work sessions. They were auditory hypo-sensitivity, tactile hyper-sensitivity, visual discrimination difficulties, proprioceptive sensitivity and vestibular hypersensitivity.

The following discussion will discuss the five sensory processing difficulties and how they influenced their group and work environment.

4.3.1.4.1 Auditory hypo-sensitivity

I noticed that both learners presented themselves as having auditory hypo-sensitivity during some group discussions. As explained in chapter 1, this is when individuals do not

respond, even when there is no background noise. They appear to be physically present, but mentally appear to be elsewhere. This will be shown with the following findings.

Learner 1 often appeared preoccupied with what was going on around him when engaged in group discussions. When his educator would draw him back into the conversation, his verbal response would be completely unrelated to what was being discussed. Learner 2's response, when his educator tried to involve him in the discussion, was more of avoidance. He responded by saying: "I don't have anything to say".

As instructions were mostly given to the group as a whole, this posed a problem for both learners, as they battled with processing the verbal instructions that were given to the group as a whole. Learner 1's educator confirmed this problem, when stating that she often had to repeat an instruction to him before he engaged in the activity, as she knew he does not process the auditory instructions.

4.3.1.4.2 Tactile hyper- sensitivity

I noticed that learner 1 was very tactile sensitive when it came to creative art materials. He avoided any messy activities, and would often smell and poke materials, before attempting to use them, if at all. He seemed to particularly dislike finger painting and natural clay activities and would complain that it made his hands dirty. His educator mentioned that he would only attempt activities that he knew he could master, like box construction to building an engine.

During all three creative times that I observed learner 2, I observed that he recreated the same activity consistently. He ignored what was asked of him to do as creative tasks and simply just made his box construction item again. His educator expressed concern about this. She found that he was partaking in very few task activities, as he complained that he did not like the way the materials felt and smelt.

4.3.1.4.3 Visual discriminatory difficulties

Learner 1 showed a clear discrepancy between certain visual stimuli, which in academic terms is referred to as visual discrimination. He could focus and see the minute differences in a picture. Yet, he often found it difficult to see something bold, which was part of the whole group display. To validate this discussion, I offer the following example.

Learner 1 was presented with a vast amount of visual stimuli on a display table and yet could not focus on any of the activities. When a 'spot-the-difference' activity was given to him to do separately, he could identify the smallest differences. His educator confirmed this, when she said: "He finds it difficult to focus in class, as there seem to be too many visual distractions. Yet, one-on-one, he can focus on a very busy visual picture and cope well."

4.3.1.4.4 Vestibular and proprioceptive sensory difficulties

During gross and fine-motor activities, learner 1 and 2 seemed to display both vestibular and proprioception sensory difficulties.

During creative time, learner 1 found it difficult to sit upright and work and could not hold the writing material with the correct grip to draw a picture that was required. As he experienced proprioceptive difficulties, while attempting to draw, the crayon literally fell out of his hand,. His response was to use his upper body to cover what he was drawing.

When attempting a movement activity learner 1 displayed vestibular difficulties when he showed postural instability. He was very aware that he could not manage the movement activity and responded by giving up on it all together. His educator responded by praising him for at least attempting to participate.

Learner 2's, fine-motor coordination seemed to have been on par with his peers. He did battle to stay seated upright and correctly at the activity table. When it came to gross-motor movements he made up his mind not to participate, even before the movement activities commenced. His educator mentioned that he felt insecure, as he knew he could not control his movements without losing his balance.

In the interview with the psychologist, her response to vestibular and proprioceptive sensory difficulties was:

> Learners with AS get very frustrated and anxious if put in a situation where they cannot cope. They will then respond by refusing to participate. Often they need a one-on-one explanation of what to do, as they often cannot respond to just a verbal instruction given in a group situation.

To conclude this fourth section, there is evidence that both learners experienced auditory hypo-sensitivity, tactile hyper-sensitivity, visual discrimination difficulties, proprioceptive sensitivity and vestibular hypersensitivity, while being part of a group or working environment.

The results of the data presented above show that both these AS learners randomly experienced sensory processing difficulties throughout all environments (physical, cultural, social and group and work environments.)

The sensory difficulties that were experienced in all the environments simultaneously were tactile, visual and auditory. Proprioceptive and vestibular sensory difficulties were prominent in the physical, social, and group and task work environments, while olfactory and gustatory difficulties were observed in the social and cultural environments.

In the next section of this chapter I will answer the second sub – question:

4.3.2 How do sensory processing difficulties influence learning and development of Grade R learners experiencing AS?

By answering the above question I intend to make explicit the connection between the learning opportunities linked to the learning areas in Outcomes-based Education (OBE) and the impact sensory processing difficulties has on the learning and development of both learners who have been diagnosed with AS.

To fully comprehend this sub-question, one has to be reminded of the developmental areas of a Grade R learner and which learning areas are incorporated. I will represent these four developmental areas in a pictorial image, In Figure: 4.2, on page 74. After which a comprehensive analytical discussion will include the following three areas:

- explorational learning opportunities linked to the learning areas in OBE;
- the responses from both learners to the sensory stimuli in their environment; and
- the impact these responses had on their learning and development.

Figure: 4.2: Developmental areas of a learner in Grade R
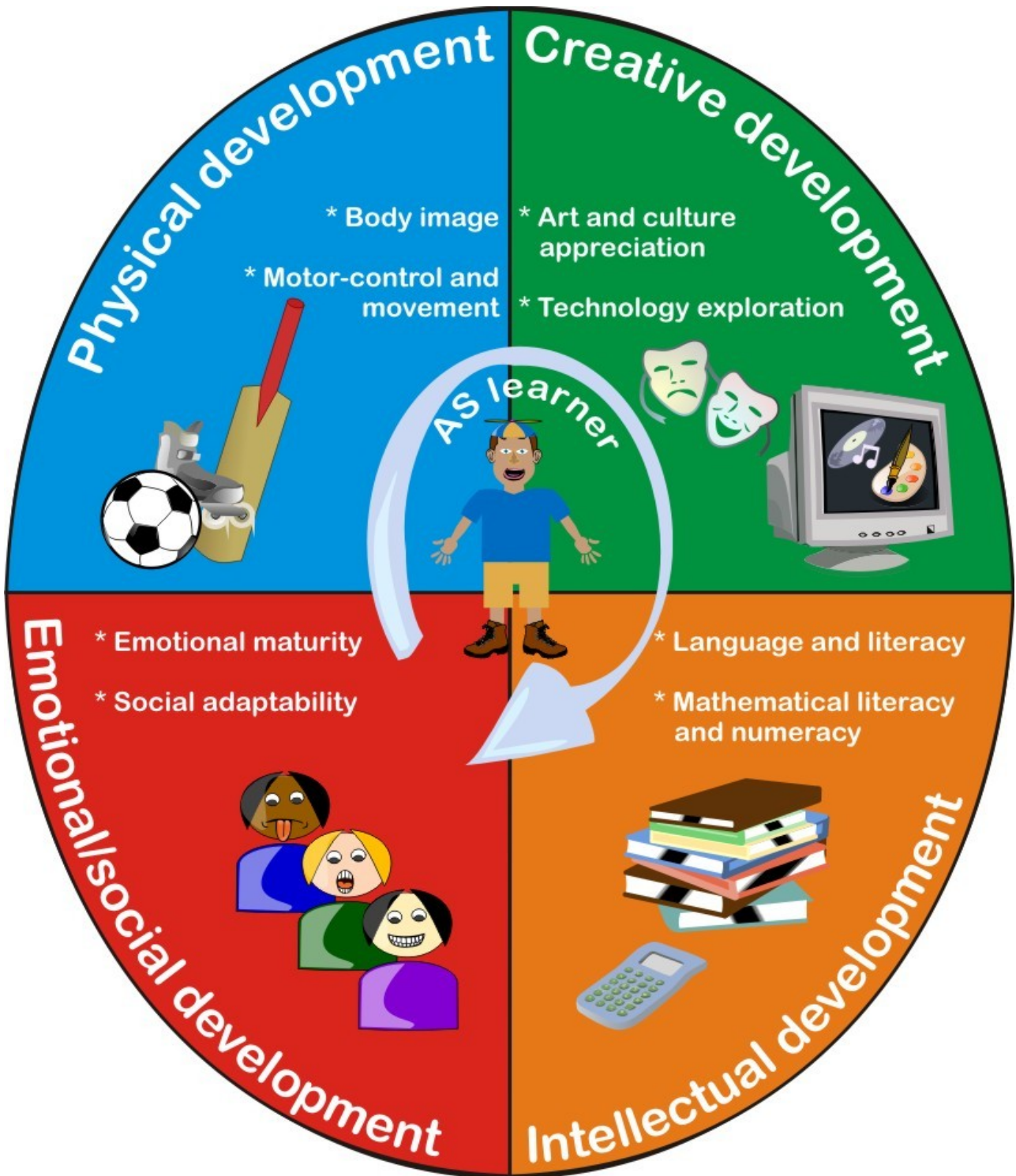
As discussed in Chapter 1, there are specific outcomes that are clearly written in the curriculum under critical and developmental outcomes. It describes *what* learners in a Grade R environment should know and *be able* to do (Appendix 6, on page 159). Learners are required to achieve these learning outcomes and assessment standards set out by WCED for their Grade R year, while interacting in their immediate environment. Keeping in mind the complex relationship and interaction that occurs between the two concepts, learning and development, one has to take note, that learning and development for AS learners is episodic and is influenced by their own developmental milestones.

The Grade R learning outcomes are based on realising the full potential of each learner and incorporates a unique blend of knowledge, skills and values drawn from South Africa and the world. Each learning area addresses the relationship between human rights, a healthy environment, social justice and inclusivity and provides a guideline of requirements and expectations for the whole learning phase Grade R to Grade 3. The only differences between each grade are the assessment standards that describe the level at which learners should demonstrate their achievement of the learning outcome.

I will now discuss the learning areas under the five headings of: Life Orientation and Arts and Culture, Arts and Culture and Technology, Home language, Mathematics and Sciences (natural, social, economic and management). Each section will begin with a table depicting the outcomes applicable to the discussion. The responses from both learners in these learning areas will then be discussed and analysed to establish in what ways the sensory difficulties impacted on their learning and development.

4.3.2.1   Learning Areas: Life Orientation and Arts and Culture

In the NCS document (2002) the outcomes for personal and physical development fall under the learning areas of Life Orientation. Some of the outcomes in the learning area of Arts and Culture, that includes dance and drama skills, also contribute to the personal and physical development of Grade R learners.

Table 4.1, on page 76 depicts the tabulated learning and developmental areas as well as their corresponding outcomes of Life Orientation and Arts and Culture, that has relevance to my study.

Table 4.1 Learning and developmental areas and outcomes for Life Orientation and Arts
and Culture

Learning areas	Development/skills	Outcomes
Life Orientation	Personal development	LO3: The learner will be able to use acquired life skills to achieve and extend personal potential and respond effectively to challenges in his/her world.
Arts and Culture	Skills to present, interpret dance and drama activities	LO1: The learner will be able to use play, fantasy and imagination to develop the skills and knowledge for creating and presenting art.
Arts and Culture	Skills of reflection in dance and drama activities	LO 2: The learner will be ale to think about, respond and focus on self and own environment.
Arts and Culture	Skills to participate and collaborate in dance and drama activities	LO 3: The learner will be able to participate and co-operate in activities to develop awareness of self and others in own environment.
Life Orientation	Physical development and movement	LO4: The learner will be able to demonstrate an understanding of, and participate in activities that promote movement and physical development.

As the above learning areas are based on outcomes from each individual learner through their personal and physical interaction with their immediate environment, the following discussion will include the developmental areas of body awareness, movement and control.

Personal and physical development areas incorporate body awareness, body movement and control. This will explain why the three senses, proprioceptive (body awareness), tactile (touch), and vestibular (balance) work together to determine how we physically interact with our world. These senses connect us with our world and bond us with others through touch and movement.

According to the data collected, both these learners experienced an ineffective processing of sensations perceived through their skin and through movement. This, I believe, interfered with how they achieved the above mentioned outcomes and the following examples will show how a lack of body awareness an understanding of body movement and the lack of confidence to participate in movement activities had an impact on their learning and development.

4.3.2.1.1 Body awareness

Good body awareness is important to engage effectively with the environment, in order to gain additional cues to give meaning about people and objects around them. Having good body awareness is thus vital in developing skills needed for development and learning to take place in the immediate environment.

To obtain clarity on this statement I will firstly mention the affect sensory processing difficulties had on the two learners' learning and development. I will then link the outcomes pertaining to development of body awareness, to examples obtained from my observation.

As identified in Table 4.1 (*Arts and Culture LO3,* on page 76), both the learners with AS showed a lack of body awareness due to sensory processing difficulties. Their responses to certain sensory stimuli affected their learning and development in many ways and prevented them from being able to achieve the outcomes set out in Table 4.1, on page 76.

Both learners found it difficult to positively manipulate objects in their environment to gain additional cues, to focus on the learning that was taking place, or to express emotions that were not irritating or harmful to themselves or others. By refusing to participate, they also missed out the learning experience that took place, adjusting to the classroom routine and following an instruction given by their educator. These responses, not only caused undue stress and disruption, but they missed out on developing a positive body image that is needed for developing and learning new skills. The ones identified were – finding their own personal space, developing of sense of direction, practising balancing activities or correctly identifying left and right side of their body.

Learner 1 showed a high need for additional tactile sensation to increase his knowledge of where his body was in the environment (tactile hypo-sensitivity). During the learning experiences, the learner responded by constantly picking up objects, often mishandling the small creatures, sitting too close to peers, constantly touching them and pulling his educators face towards him when verbally communicating with her.

Learner 2 also experienced difficulty orientating himself and using his body effectively in the environment. As he experienced tactile hyper-sensitivity during the learning experiences, his responses were to show actual physical discomfort when engaging with peers or some objects like some recycling materials. He displayed this response by over

reacting when touching some items and physically shoving his peers away, or jumping up and moving away, when he felt crowded in the group.

The second relevant observation is that both learners came across as clumsy, spatially unsure and with poor coordination. This resulted in them finding it difficult to orientate their limbs, and they were slow to comprehend what was happening around them. They mostly ambled around in a laboured fashion, knocking into people and objects, while trying to orientate themselves. Being tactile hyper-sensitive and having proprioceptive sensory difficulties, their responses often were to physically lash out by pushing or shoving, or just by avoiding instructions or participation. These responses affected their ability to think about, respond and focus on self and own environment, or effectively participate in activities that promoted movement and physical development.

4.3.2.1.2   Motor planning and control

Learners need to be aware of where their body is in relation to their environment. A learner who feels uncomfortable in his own skin may have poor motor-planning. He may move awkwardly and have difficulty planning his movements due to tactile and vestibular hyper-sensitivity. Having a good body awareness and motor planning and control is needed to develop skills to effectively participate in activities that promote movement and physical development.

According to the findings obtained from my data the following difficulties had an impact on their learning and development and prevented the learners to achieve the outcome stated in *Life Orientation LO4. and Arts and Culture LO 1* (in Table 4.1, on page 76).

Both learners displayed difficulties in conceptualising, organising and carrying out the sequence of the movement, which forms an integral part of their learning and development. I also observed that both learners struggled to cross the midline. The inner awareness of left and right and the lateral purposeful movements of the body, and the skill of eye-hand coordination were hampered by both learners being tactile hypo-sensitive or hyper-sensitive and vestibularly uncoordinated The following examples will show the responses that verify these findings.

Both these learners opted not to be involved in some of the gross-motor activities as it meant shoving other learners away when they got too close to them, or accidentally

touching them. When they did get involved, they responded by being over-sensitive to touch, would make inappropriate and clumsy movements, as they seemed to be spatially unsure about in which direction to move.

During my observations, learner 1, when partaking in fantasy play, was uncoordinated and bumped into other learners many times. Learner 2 responded with a low tolerance and irritation, when he was expected to partake in a learning experience that involved fantasy play around the movement of some small creatures. He got frustrated when he could not cope and eventually gave up. As they found it difficult to partake in the learning experiences, they missed out on achieving the outcomes and assessment standards that were incorporated in these activities.

4.3.2.1.3   Confidence and participation

I became aware that both these learners with AS showed a lack of confidence and this mostly resulted in their refusal to participate. *The outcome for Arts and Culture LO3* (in Table 4.1, on page 76), mentions that learners need to participate and co-operate in activities to develop awareness of self and others in their own environment.

Both learners, when having to participate in motor activities like organising and performing activities that involved an association of movements (like throwing and catching the ball, balancing on a beam, climbing the jungle gym or partaking in the activity involving the monkey bar), showed a low tolerance to these activities and refused to partake in most activities. For the same reason I noticed that they both avoided the climbing apparatus during free play time and would not venture on any of the equipment in the playground.

When both the learners were involved in manipulation of writing and working objects that involved strengthening the learners' fine-motor skills, like cutting and drawing, they showed a lack of confidence and skill. This was observed when they both found it difficult to sit and work upright at the table and when they manipulated a pair of scissors or the drawing utensils.

In the next section I will present the applicable outcomes in the learning areas Arts and Culture and Technology. This will be tabulated in Table 4.2, on page 80. A discussion will follow that will mention the impact of both the learners' sensory difficulties on learning and development and discuss the responses observed to substantiate these findings.

4.3.2.2. Learning Areas: Arts and Culture and Technology

The learning areas of Arts and Culture and Technology incorporates the creative development of learners. This is where learners can freely create images of their own world by investigating, designing and making use of a wide variety of art materials.

To have a clearer understanding of how an AS learner will acquire a learning experience from being creatively involved in their environment, one has to look at some of the outcomes as set out in the learning areas of Arts and Culture and Technology set out in Table 4.2 below.

Table 4.2 Learning and developmental areas and outcomes for Arts and Culture and Technology

Learning Areas	Development	Outcomes
Arts and Culture	Creative development, skills of creating, interpreting and presenting visual arts	<u>LO 1</u>: The learner will be able to create and present work in the visual arts.
Arts and Culture	Creative development, skills to reflect during visual art activities	<u>LO2</u>: The learner will be able to reflect critically on artistic and cultural processes, products and styles in past and present context.
Arts and Culture	Creative development, participating and collaborating skills	<u>LO 3</u>: The learner will be able to demonstrate personal and interpersonal skills through individual and group participation in the visual arts.
Arts and Culture	Creative development, expressing and communicating	<u>LO4</u>: The learner will be able to analyse and use multiple forms of communication and expression in visual arts.
Technology	Processing skills to investigate, design, make and evaluate products	<u>LO1</u>: The learner will be able to apply technological processing and skills ethically and responsibly using appropriate information and communication technologies.

As the two learning areas are so closely linked, I will use the sub heading - Arts and Culture appreciation and Technology exploration. In this section the importance of visual arts and technology will be argued and the learning areas and outcomes introduced, followed by how the sensory difficulties of both learners influenced their learning and development. Examples of responses and willingness to participate will be incorporated in this discussion.

4.3.2.2.1 Arts and Culture appreciation and Technology exploration

Through my observations, I became aware that creating objects out of art, from various art materials, goes way beyond the final project. The whole process of interaction with various materials is more of a learning experience, and it is through exploration that learners build knowledge of the objects in the world around them. During this process they learn to make independent choices and decisions that mould their appreciation for the art forms.

The outcomes that stimulate this appreciation in learners, are found in the learning areas of Arts and Culture and Technology (Table 4.2, on page 80). This includes the following: the learners must be able to create and present work, reflect on it critically, partake in group activities, use multiple means of communication and apply technological processing effectively.

The sensory difficulties observed from both learners while being involved in these learning areas, influenced them in various ways. By not participating in any of the creative activities set out, these learners missed the chance to acquire any of the explorational, experimental, and problem-solving possibilities. As most of the activities involved manipulation of materials, they overlooked an opportunity to develop skills like cutting, pasting, drawing or manipulation of small materials. The observation from the data will now explain how their responses hampered these areas of development and learning skills. I observed that both these learners found the creative time with art and waste materials very challenging. They where very careful at selecting the materials they were willing to manipulate. Their responses when being involved in creative activities were very similar. I will illustrate how these learners had difficulty in achieving the outcomes and assessment standards stipulated for contribution to the development of their creativity.

Learner 1 would go straight for the box-construction section without fail, not even giving the other activities a second glance. I noticed that when the educator insisted that he first attempt one of the other activities, he often showed tactile and olfactory sensitivity. He could not tolerate the glue, finger paints and texture of some of the items, like candle wax, finger paint and wet soil on his hands. His response was to pick up the containers and complain that it smelt funny and he did not like getting it on his hands. He did the activities as quickly as possible without giving any creative thought to what he was doing and then

would run and wash his hands. He then spent the rest of the time making his own box-construction, which was mostly a pump or an engine.

Learner 2 responded by refusing to participate and would, during creative time, fetch his own box-construction items, such as carlton roll tubes and masking tape, to make a space-gun to shoot the 'Invaders'. Only once did his educator get him to make a drawing and collage representing a garden with paper and other waste materials. This was done under great protest, while complaining he hated the smell and taste of the crayons and glue.

In the following section I will introduce the learning areas Home Language and Mathematics, which incorporate the intellectual development of a learner. The discussion of both learners' responses and sensory difficulties will be lead under the headings of Language/Literacy and Mathematical Literacy/Numeracy.

Research has shown that AS learners have an average to above average intelligence, are concrete and literal thinkers, have problem-solving and organisational problems and have difficulty in discerning the relevant from irrelevant stimuli (Attwood, 2007: 256). To show how the sensory processing difficulties exacerbated these traits, I have mentioned the outcomes that directly relate to the academic learning of a Grade R learner in Table 4.3, on page 83. They are found in the leaning areas of English Home Language and Mathematics.

4.3.2.3.   Learning area: Home Language

Table 4.3 Learning and developmental areas and outcomes for Home Language

Learning Areas	Development	Outcomes (LO)
Language (Home language)	Listening	<u>LO</u> : The learner will be able to listen for information and enjoyment, and respond appropriately and critically in a wide range of situations.
	Speaking	<u>LO2</u>: The learner will be able to communicate confidently and effectively in spoken language in a wide range of situations.
	Pre-reading and viewing skills	<u>LO3</u>: The learner will be able to 'read' and view for information and enjoyment, and respond critically to aesthetic, cultural and emotional values in text.
	Pre-writing skills	<u>LO4</u>: The learner will be able to practice pre-writing skills of factual and imaginative texts for a range of purposes.
	Thinking and reasoning	<u>LO5</u>: The learner will be able to use language to think, reason, as well as to access, process and use information for learning.
	Language structure and use	<u>LO6</u>: The learner will be able to use sound, words and grammar for language to create and interpret texts.

4.3.2.3.1 Language and literacy

As mentioned in Chapter one, learners with AS have an unusual profile of language skills. They often have delayed speech development, impairments of comprehension including misinterpretation of literal/implied meanings in Table 1.2 on page 11 Having sensory processing difficulties, I believe, can only exacerbate the development of literacy skills in these learners. The following section will support this statement.

The outcomes that fall under the learning area of Home language cover the following skills: listening, speaking, pre-reading, pre-writing, thinking and reasoning and language structure and use. The impact that sensory processing have on this learning area will be explained through the responses observed from both learners.

Both these learners had a problem of orally giving an appropriate answer that directly related to the topic under discussion. Learner 1, when drawn into a conversation on growth, said something totally unrelated: "I make a machine that pump water". Learner 2, when asked what waste materials can be used for, responded by saying: "Dinosaurs Rex only eats leaves". Giving an inappropriate answer is often because AS learners cannot

interpret, or understand the content of a conversation. When asked to comment, they would then volunteer information that they are familiar with, or can speak confidently about.

During an interactive group discussion involving phonics, learner 1 was so distracted by the florescent light flickering above, that he could not focus on the phonics lesson. When he was drawn into the discussion, he could only refer to the florescent light that was broken. Auditory difficulties prevented learner 2 from focusing on, and participating in, the rhyming words in a story. He kept referring to the noise of a 'squeaking wheelbarrow' outside the window. As these learners could not focus on what was discussed, they both had to be reminded of what was expected of them and of the learning experience they could have benefited from.

Both learners displayed auditory and visual processing difficulties and found it difficult to distinguish fantasy from reality. This resulted in the misinterpretation of the implied meaning of discussions. During a group story on 'Moses and the plagues' learner 1 responded by saying: "We don't have blood coming out of our taps". A similar response was during a memory game 'who stole the cookie from the cookie jar', where he could not understand the rules of the game.

With both these learners having an overriding interest, it affected their language development of what they heard, saw and knew from their own life experiences. This resulted in them not being able to transfer abstract information appropriately. This was observed when learner 1 referred to his body as a machine: 'My batteries are running flat', when he tried to opt out of participating in a listening fantasy game.

In the second learning area Mathematics, I will show the outcomes in Table 4.4, and these will be discussed under the heading of Mathematical Literacy and Numeracy.

4.3.2.4   Learning area: Mathematics

Table 4.4 Learning and developmental areas and outcomes for Mathematics

Learning Area	Development	Outcomes
Mathematics	Recognition of number, operations and relationships	<u>LO1</u>: The learner will able to recognise, describe, and represent numbers and their relationships, and to count, estimate, calculate and check with competence and confidence in solving problems.
	Recognition of patterns, functions and algebra skills	<u>LO2</u>: the learner will be able to recognise, describe and represent patterns and relationships, as well as to solve problems using algebraic language and skills.
	Recognition of space and shape (geometry skills)	<u>LO3</u>: The learner will be able to describe and represent characteristics and relationships between two-dimensional shapes and three-dimensional objects in a variety of orientations and positions.
	Measurement skills	<u>LO4</u>: The learner will be able to use appropriate measuring units, instruments and formulae in a variety of context.
	Data handling skills	<u>LO5</u>: The learner will be able to collect, summarise, display and critically analyse data in order to draw conclusions and make predictions, and to interpret and determine change variations.

The following discussion will be discussed under the heading of Mathematical Literacy and Numeracy. The relevant outcomes will be mentioned and the learners responses will be analysed accordingly.

4.3.2.4.1 Mathematical literacy and numeracy

Under the learning area of Mathematics the following outcomes are stipulated in the NCS (2002). They cover the following skills: number operations and relationships, pattern, functions and algebra, space and shape, measurement and data handling.

The following section will show that both these learners experienced difficulty with the 'concrete' knowledge of their body and the world, and the examples will argue how the sensory processing difficulties experienced by both learners had an indirect influence on their experiences to develop the ability to understand the working of numbers and problem-solving techniques.

Both learners could not cope with the extra visual and auditory stimulation that was used during a music and movement activity involving number recognition and sequencing. They isolated themselves from the group and learner 1, who was more sensory intolerant, sat with his hand over his ears, trying to block out all the noises. This prevented learner 1 from actively participating in the activities involving number recognition, sequencing and the grouping of objects.

During a fire safety presentation where learner 1 could not cope with what he heard and saw, he isolated himself from the group by sitting at the fire escape exit door. He would not complete any numeracy activities that had to do with fire safety and subsequently failed to benefit from the learning experiences of number recognition, sequencing and measuring units.

A similar response was observed when learner 2 removed himself from all activities set out involving numeracy (puzzles, counting games, shape and size recognition and games with rules). He could not cope with the visitors that were helping to facilitate these games. Both these learners missed the opportunity of developing skills involving, number recognition, algebra, geometry measuring and data handling.

What I did notice when analysing my data, was that both these learners could manage independently to do basic puzzles or sequencing games and other numeracy games, but when other stimuli were added to their environment (music in the background, extra visitors), they lost focus and gave up all together.

In the next few sections I will explain how the learning areas of Sciences (Social, Natural, Economic and Management) reflect the principles of social justice, respect for the environment and human rights, as defined in the curriculum. This section will include the social and emotional development and how both learners with AS had difficulty with sensory processing in their environment, and how this influenced the learning area of sciences.

4.3.2.5   Learning Area: Sciences (social, natural, economic and management)

Table 4.5, on page 87 will show how the critical and developmental outcomes of the Sciences incorporate the skills, values and attitudes needed to successfully use critical and creative thinking and to develop entrepreneurial opportunities. In this section under

the sub-heading of social adaptability and emotional maturity the outcomes in Table 4.5, will be introduced and the findings discussed.

Table 4.5 Learning and developmental areas and outcomes in the sciences

Learning Area	Development	Outcomes
Social Sciences	Social adaptability and emotional maturity regarding History and Geography	LO1: The learner will be able to use enquiry skills to investigate the past and present and geographical and environmental concepts and processes.
		LO2: The learner will be able to demonstrate historical, geographical and environmental knowledge and understanding.
		LO3: The learner will be able to interpret aspects of history and make informed decisions about social and environmental issues and problems.
Natural Sciences	Social adaptability and emotional maturity	LO1: The learner will be able to act confidently on curiosity about natural phenomena, and to investigate relationships and solve problems in scientific, technological and environmental context.
Economic and Management Sciences	Social adaptability and emotional maturity	LO1: The learner will be able to demonstrate knowledge and understanding of the economic cycle within the context of the economic problem.
		LO2: The learner will be able to demonstrate an understanding of reconstruction, sustainable growth and development, and to reflect critically on its related processes.

4.3.2.5.1 Social adaptability and Emotional maturity

The outcomes in Table 4.5, incorporates understanding, participation and confidence. When children participate in activities with classmates, the feedback they give to each other builds self-esteem by helping them learn to accept criticism and praise from others. Small group activities also help children practice important social skills like taking turns, sharing, and negotiating for materials.

My data findings revealed that both these learners found it difficult to stay focussed and often found it difficult to participate in all the activities. Here all seven senses contributed to these learners adaptation to their environment. The following examples obtained from my data, will explain this in more detail.

In was evident from my observations that both these learners struggled to follow rules and regulations set out by the class educator. They both took at least ten minutes to join a

group discussion or to settle down and do an activity. This behavioural response, I believe was because of their awareness of their spatial insecurity. This was observed, when learner 1 displayed a similar response when it was 'toilet routine', and he refused to join the group. Learner 2 refused to sit on a rubber mat during an outside gathering and went to sit in the ablution block for the duration of the time. This meant that they missed the learning experience that was incorporated in the discussions.

As already established, one AS characteristic is that they often do not perceive body language and expressions correctly. By added sensory difficulty it can result in added stress and anxiety. Learner 1, in more than one instance, was very upset that his peers would exclude him from their games. (eg. 'Woolfie Woolfie what's the time?' – a game with specific rules of participation and patience.) As he often reacted immaturely, by being impatient or being over-sensitive to touch, his peers complained that he spoilt their game. Learner 2, when approached by a group of peers to join in his Dinosaur fantasy game, was teased when he displayed anxiety and refused to venture on the jungle gym or climb in the tree. He made matters worse when he threatened to try and pull his skin off, by saying: "Look I'm a Dinosaurs Rex and I'm not human". This response lead to his peers walking away leaving him isolated and out of the rest of the game.

When extra auditory and visual stimuli were added to their environment, it often caused both these learners to become anxious and distressed. They lost focus and interest in the learning experiences that were taking place. The following responses from the two learners will explain this statement.

Learner 1, during a music presentation, could not cope with the added guitar sound. He moved into a corner and sat with his hands over his ears and rocked back and forth to try and block out the noise. Leaner 2 responded similarly, but handled the situation more maturely, by removing himself and leaving the room. These inappropriate social and emotional responses prevented any social interaction and learning experiences from taking place.

When unfamiliar smells, and certain taste sensations were added to their environment these learners showed a distinct dislike to what they smelt (cleaning materials) and an outright refusal to participate in certain tastes like fruit. Their over-reactive responses were in both these cases a disruption to the routine of the class. Both AS learners did not benefit

from investigating relationships and solving problems in the scientific and environmental context.

4.4   CHAPTER SUMMARY

This chapter was aimed at setting out the data from the observations and interviews. The data highlighted the sensory processing difficulties the two AS learners experienced during the observation period. The analysis has shown the impact it had on their learning and development in terms of the NCS (2002).

As I have incorporated the results in each section and discussed them, I will now only highlight and consolidate the main results as follows:

- Both learners randomly experienced sensory processing difficulties from all seven senses. They were tactile, visual, auditory, proprioceptive, vestibular, olfactory and gustatory.

- The three sensory difficulties experienced throughout all environments were: tactile, auditory and visual. Proprioceptive and vestibular difficulties were prominent and olfactory and gustatory difficulties were occasionally observed.

- Both learners were spatially unsure and showed difficulty judging body position in relation to objects and people in the environment. This caused difficulty with positively manipulating objects in their environment to gain additional cues, to focus on the learning that was taking place, or to express emotions that were not irritating harmful to themselves or others.

- The low tolerance to certain tactile experiences limited their exposure to create, interpret and present work in the visual art from. By not partaking in any of the creative activities set out, these learners missed out on the opportunity to acquire any of the explorational, experimental, and problem-solving opportunities.

- As most of the activities involved manipulation of materials, they lost out on developing skills like cutting, pasting, drawing or manipulation of small materials.

- Both these learners experienced an ineffective processing of sensations perceived through their skin and through movement. It interfered with how they organised themselves and interacted and responded in their environment.

- As they experienced difficulty in conceptualising, organising and carrying out the sequence of movements, they did not demonstrate effective body movement and development.

- These learners displayed poor body-image based on motor planning difficulties. It affected their ability to express themselves through movement and generate ideas and problem-solving skills.

- Both learners displayed auditory and visual processing difficulties and found it difficult to distinguish fantasy from reality. This resulted in the misinterpretation of the implied meaning of the discussions at hand.

- With both these learners having an overriding interest, it affected their language development negatively, by not appropriately transferring abstract information of what they heard, saw and knew from their own life experiences.

- Both these learners could manage independently to do basic puzzles or sequencing games and other numeracy games, but when other stimuli were added to their environment (music in the background, extra visitors), they lost focus and gave up all together.

- These learners experienced difficulty with any change in their environment. With added sensory stimuli they often did not respond in a socially acceptable way.

- AS learners often do not perceive body language and expressions correctly. With added sensory difficulty it can result in undue stress and anxiety. This impacted on them being included in a group activity, and building lasting friendships.

Chapter 5 will interpret the findings in relation to the learning context, and impact of the sensory difficulties on the learning and development of the two learners experiencing AS. I also offer conclusions and a few recommendations.

CHAPTER 5

5. DISCUSSION, RECOMMENDATIONS AND CONCLUSIONS

5.1 INTRODUCTION

The aim of this study was twofold, firstly, to identify sensory processing difficulties experienced by AS learners in Grade R while attending a mainstream school, and secondly to determine the impact these identified sensory difficulties had on their learning and development in terms of NCS (2002). This chapter will offer interpretations, discussions, recommendations and conclusions that have emerged from the studies about AS learners and sensory processing difficulties.

5.2 DISCUSSION

In the previous chapter the findings were presented. This chapter will discuss other interpretations and insights that have emerged from the study, namely: significance of early diagnosis and identification of AS individuals; social and emotional support for AS learners; focussing on positive rather than negative traits of AS learners; identifying the cognitive abilities of individual AS learners, and mediated learning and community support. Each insight will be reviewed in relation to the theoretical framework outlined in Chapter 2.

It has become increasingly common in SA to include young children with disabilities in environments with typically developing children, partly in response to legislation that supports this mode of providing early education services for all children. Kontos & Diamond (in Winton, et al., 1997: 393) posit that development of professional skills that support inclusion has thus been added to the large cluster of competencies that have typically defined early intervention and early childhood education as professions. The support systems in South Africa, which the NDoE (2003) has envisaged are the District Based Support Teams, Resource Centres, Full Service Schools and Institution-level Support Teams.

Early childhood special education grew from the recognition of the importance of providing intervention for learners with special needs, to prevent and to reduce the impact of barriers to learning on the learner's future development. Kontos & Diamond (in Winton, et al., 1997: 295) mentions that consequently early childhood special approaches have emphasised the

importance of many services too, for example, individualised teaching plans, and methodologies (that result in skills acquisitions), and the involvement of professionals to provide guidance and assistance.

Learners with special needs who attend a mainstream school follow the same Grade R curriculum. The OBE curriculum is grounded in the work of Piaget (1973 & 1978), Vygotsky (1978 & 1993) and Feuerstein (1980 & 1991). As learners experiencing AS have their own learning style and often view the world differently from their peers, it is important for educators to be made aware of AS learners' characteristics to assist them in acquiring knowledge in their own unique way. In the Grade R environment, learning focuses on the social interactions and interdependence of individuals while in the process of acquiring knowledge. The social interaction and interdependence can pose a challenge, not only for the learner experiencing AS, but also for the educator and supporting staff.

Kontos & Diamond (in Winton, et al., 1997: 395) state that child-centred environments in which play more than direct instruction is the medium of learning, is the ideal learning environment. Piaget's theory on how learners acquire knowledge, is viewed as a natural process that is internally driven. Knowledge is not acquired by the learner, but by the interaction between the object in the world and the learner. Piaget's basic principle of active education methods may be expressed as follows:

> To understand is to discover, or reconstruct by
> discovery, and such conditions must be complied
> with if in the future individuals are to be formed who
> are capable of production and creativity and not
> simply repetition (Piaget, 1978: 20).

Piaget's learner-centred theoretical approach has become known as the 'constructivist revolution in psychology' (WCED, 2000: 17). This theory of learning emphasises two important dimensions:

• learners actively acquire existing knowledge (language, cultural wisdom, technical skills, school discipline etc.) as their own system of knowing; and

• learners actively construct their own novel ways of knowing in the face of unfamiliar problems.

Vygotsky and Feuerstein agreed with Piaget, but their theory on 'how children acquire knowledge' is seen in the course of social relationships, where learners participating with more knowledgeable people, and the new knowledge is then mediated to them (Presseisen & Kozulin, 1992: 37).

In the school context, and especially in terms of inclusive education and AS learners, Piaget's, Vygotsky's and Feuerstein's constructivist theories emphasise the importance for educators to recognise and accommodate these learners' special needs. By early diagnosis and identification of AS individuals; providing social and emotional support, focussing on positive rather than negative traits, identifying their cognitive abilities and embracing mediated learning and community support, the educator can assist learners experiencing AS to function optimally in an inclusive learning environment.

5.2.1   Early diagnosis and identification of characteristic traits of AS learners

It is stated by both Frohna (2005: 283) and Attwood, (2007: 13), that early intervention can result in significant improvements for some children with AS. The early identification diagnosis is an important step towards gaining awareness of how AS learners perceive their world through their senses. Once the diagnosis is confirmed and understood, there can be a significant positive change in the expectation, acceptance and support from educators and peers. The AS learner will now be more likely to be respected for their achievements and more tolerance will be shown towards their unique characteristics. From the observations I noted that the two AS case studies were diagnosed early and were included in the OBE inclusive programme, and their unique ways of perceiving their world were identified and embraced by both educators.

Piaget (1973) advocates the use of what he calls 'active methods' in education. If AS learners, are identified in their pre-school years, and the educators are made aware of their unique way of perceiving their world, they can organise and create the situations and present useful problems, while keeping in mind the AS learner's learning style. If the learner is showing distress, the educators can provide counter-examples that compel reflection, and will result in alternative solutions to the problem at hand. The findings suggest that the educators were aware of the AS learner's learning and developmental traits and accommodated their diversity in both classrooms.

As the educators involved in this study *were* made aware of the sensory processing difficulties that the AS learner could experience while interacting with objects, they were able to assist in implementing support structures, or arrange alternative learning opportunities. This was so that the learners could have the experience of acquiring knowledge similar to their peers.

5.2.2   Social understanding and emotional support for learners experiencing AS

The South African government, through Early Childhood Development (White Paper 5 2001: 2), committed themselves to an adequate response to the needs of young children. They also noted that education was one of the most significant aspects of a child's development, and that social, emotional and physical development were equally crucial.

The findings indicate that social and emotional development are areas that AS learners need guidance with and support from their educators and support teams. Asperger (1944: 58) notes that normal children acquire the necessary social habits without being consciously aware of them, they learn instinctively. These instinctive relations are disturbed in AS children. Social adaptation has to proceed via cognitive intervention. Here Asperger (in Frith 1991: 58) mentions that one of the clearest signs of AS is qualitative impairment in social interaction. This criterion also includes a lack of social or emotional reciprocity and failure to develop peer relationships appropriate to their developmental level. These social and emotional characteristics of AS learners can pose a challenge for not only the learners experiencing AS, but also with all involved in their learning environment.

Vygotsky's theory (1978) on cultural and social interaction plays an important role in a Grade R environment, as the learners mostly acquire knowledge through interaction, not only with their immediate environment, but also with their peers or other adults. Vygotsky (1978) sees this process of cognitive development as an active internalization of a set of relationships that are to be found originally in real cultural activity. From the observations it was apparent that both AS learners struggled with social interactions and this negatively impeded their acquisition of knowledge.

According to Erikson's theory (in Boeree 2006: 6), pre-school children are increasingly able to accomplish tasks on their own as they become more independent. This results in pre-school learners making their own choices. The findings in this research project have

indicated that both AS learners had difficulty with taking initiative as they often could not respond positively to challenges in the classroom, could not participate in games and were often found playing on their own. Their responses would often result in refusal to participate, as they lacked confidence. Their educators needed to assist them in making correct choices. In the classroom the educators also attempted to create an awareness of the social and emotional challenges of these learners. As they got to know the learners, they put support structures in place to assist the AS learner in identifying and implementing appropriate social skills.

In my case study, both educators were informed of the AS learner's social and emotional impairments and were made aware of how sensory difficulties can cause further social and emotional 'accidents'. The educators put social guides in place and introduced, for example, social stories to help the learners understand certain social situations.

As the educators made the peers in the class aware of the AS learner's social and emotional challenges, they were encouraged to facilitate and guide their AS learners when they perceived or experienced a social or emotional problem. Encouragement and positive reinforcement played an important role in this mediated process. In learner 2's class the slogan implemented was: 'Sharing is caring' and was encouraged in all areas of interaction.

5.2.3 Positive traits of learners experiencing AS

Many AS individuals have normal to above-average intelligence and many may have one or more highly developed talents or assets (Williams, 1995: 6). It was noted, in this research project, that both AS learners had special interests and were knowledgeable and confident when discussing or referring to their particular interests.

In an asset-based approach, the mere identification of assets is insignificant if not translated into action. Ebersöhn & Mbsetse (2003: 323), mention that after identification and awareness of assets or talents, cooperative relations are initiated between individuals, associations and institutions. The educator, as a facilitator, assists a learner in discovering, developing and realising their own direction, goals and outcomes.

Vygotsky (in Zuckerman, 2003: 196) and Feuerstein (in Greenberg, 2000: 310) agree that at the beginning of formal education it is the educator that structures the conditions for

learning activities and later the learners themselves will change the conditions to suit the learning activity and find new ways of interacting with the learning environment.

My findings showed that both educators planned at least one activity per day focussing on the AS learner's interests. This was done to create an opportunity where these learners would experience success. It was noted that often, other peers would also show an interest and engage in the activity with the AS learners. The positive outcome would be the social and emotional interactions amongst all the learners, which enhanced the AS learners' self-esteem. Generally, the AS learners were impressed with the creations of the activities and this resulted in them acquiring new skills and knowledge.

5.2.4 Identifying cognitive abilities of learners experiencing AS

According to Attwood (2007), educators soon realise that a learner experiencing AS has a distinctive learning style, being talented in understanding of the logical and physical world, noticing details and showing talent in memorising long lists of facts. Greenberg (2000: 30) states that learning consists not only of constructing meaning, but also of constructing systems of meaning. For example in a Grade R classroom, a crucial action of constructing meaning is mental as it happens in the mind. Physical actions and hands-on experiences are necessary for learning.

During my observation I noticed that both educators provided activities that engaged both mind as well as hands. My findings showed that learners experiencing AS did not have a problem with constructing their own meaning when it involved understanding the logical situations that happen in their environment. An example of this was while creating a collage out of seeds, learner 1 wanted to take the seeds outside to plant, rather than constructing a collage of the different seeds in the classroom. However, problems arose when he had to physically interact with the creative material to acquire additional knowledge.

Attwood (2007: 257) indicated that learners experiencing AS tend to continue using incorrect strategies and are less likely to learn from their mistakes, even when they know their strategy is not working. It is thus up to the educator to encourage flexibility in thinking at a very young age. Both educators used social games to assist in changing the learners' perceptions of errors and mistakes.

5.2.5 Mediated learning and community support

Recent research has shown that programmes for early childhood development has moved from specifically focussing on cognitive development to a much broader orientation that realises that early intervention programmes need to be broader-based with elements of strong support team involvement to facilitate long-term cognitive benefits (Shonkoff & Phillips, 2000:3).

My findings indicated that while doing an activity with the whole class, the learners were encouraged to problem-solve and ask related questions. However, it was during these times that the facilitators were near the AS learners to guide them in this process.

The term 'scaffolding' is used to describe the support which learners receive during their interaction with parents, educators, and other mentors, as they move towards developing new skills, concepts, or levels of understanding. I observed that the AS learners in this case study, were not only supported by their educators, parents and a facilitator, but also received intervention from a variety of other educational health practitioners such as the speech and occupational therapists. It was clear that this holistic approach in these ECD classrooms worked in harmony to create an optimal learning and developmental environment for these learners.

 Feuerstein (in Greenberg, 2000: 31) argues that mediated learning occurs naturally in many interactions between parents and child and between educators and learners because of the older individual's need to transmit cultural knowledge to the younger generation. Educators, parents and others supporting individuals need to 'model' the appropriate interactions and provide the opportunity for the development of necessary life skills. By role-modelling appropriate knowledge, skills and values to the AS learners the educators and support team promote a positive learning environment so these AS learners can develop to their full potential.

5.3 RECOMMENDATIONS

It has become apparent that placing learners with barriers to learning in inclusive settings without support will not result in meaningful outcomes. Based on the findings of the study the following recommendations are proposed:

- Pre-schools and Grade R educators in South African schools should all be made aware of the characteristics that young children experiencing AS display. Research done by Gillberg (1998); Wing (1981) and Attwood (1998 and 2007), has shown that some young learners, aged between two and four years old, are more often diagnosed with 'autism' rather than AS. However as the children grow older, by the time they are five to six years old, they are then diagnosed with AS. It is recommended that once these AS characteristics are identified, support structures can be put into place to assist the child make better sense of his world.

- All the diagnostic criteria mentioned in this study acknowledge a qualitative impairment in social interaction and a difference in the understanding and expression of emotions in AS individuals. Attwood (2007: 55) mentions that the best way people deal with these characteristics of AS individuals is to allow them to withdraw from society and their world. It is advised that teachers in training, educators, peers and parents must be made aware of this anti-social behaviour and be encouraged to find ways and means to assist these learners to develop social and emotional strategies to interact positively within their environment.

- One of the characteristics that defines AS is their restricted, repetitive and stereotypical patterns of behaviour, interests, and activities. It is recommended that educators recognise the learners' special interests and build on them to develop the necessary skills. Individuals working with AS learners need to acknowledge that these special interests, can embrace certain functions, for example, to overcome anxiety, provide pleasure, to help understand the physical world, to show a specific intellectual ability and to create a sense of identity of the AS learner (Attwood, 2007: 200).

- Some AS learners start their school career with academic abilities above their grade level. Educators and peers need to be made aware of the AS learners' distinctive learning styles and make provision for it in the inclusive learning environment. It is

recommended that educators get to know their learners' strengths and challenges early in the year, so provision can be made for inclusion of their special interest in the curriculum throughout the year.

- Early childhood special education, general education and therapeutic interventions are 'blended' in practice. Learners experiencing AS need to receive a comprehensive developmentally appropriate programme side-by-side with peers who participate in the same activities, with adaptations to those activities as and where needed. It is thus of vital importance to include a multidisciplinary support team, composing of educators, parents, health workers, LSEN educators and capable peers.

- This complex set of relationships can assist learners experiencing AS, not just to develop to their full potential, but to one day become a valuable contributor in society. In turn, the learners themselves can promote more positive encouraging attitudes towards individuals experiencing AS. Figure 5.1 depicts this complex relationship that can assist an AS learner to make sense of his/her world.

Figure 5.1 Effective learning and development in a complex set of relationships
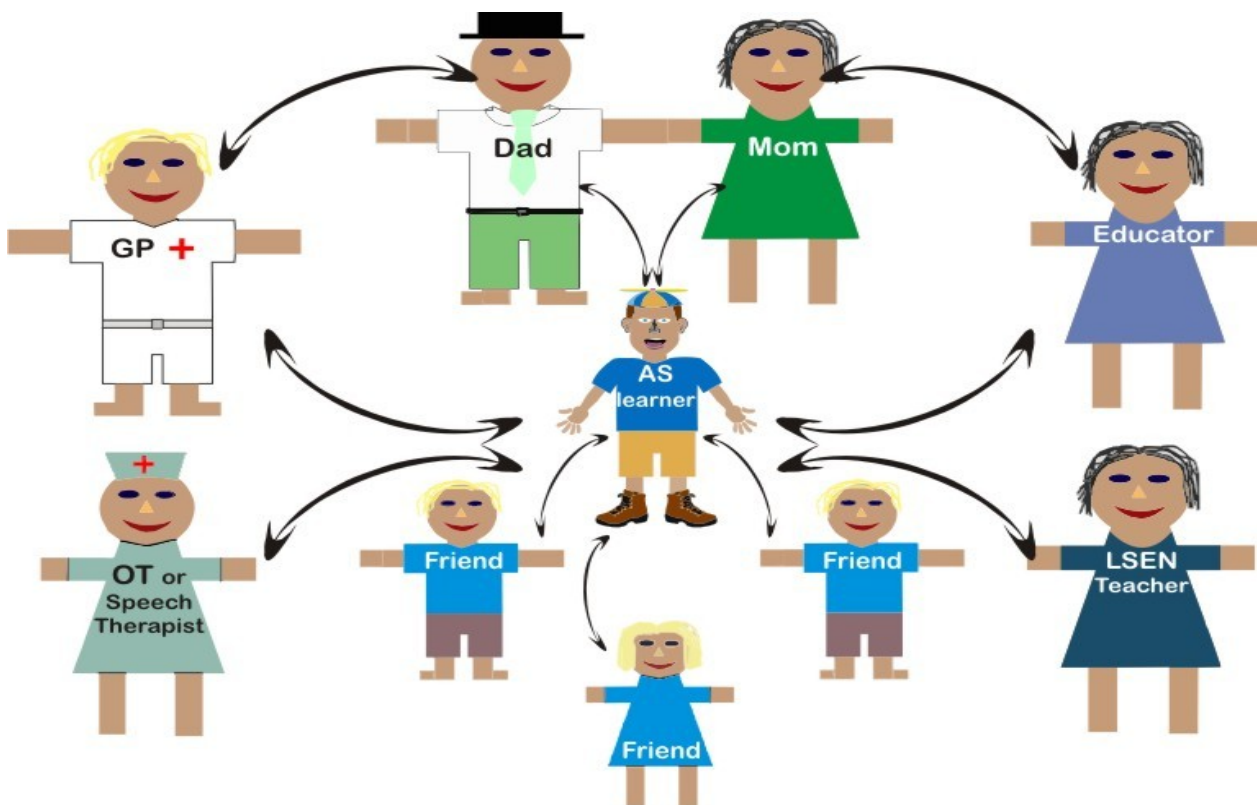
5.4   CONCLUSION

To assist young learners experiencing AS in South African schools the NDoE needs to make educators aware of the characteristics of these learners, so they can be identified, and support structures can be put in place and implemented. When an AS learner is identified, training should be provided for the teacher trainers, educators and additional assistance given, where the parents are not able to afford a private facilitator.

Although the challenges associated with AS may be debilitating many AS individuals display positive achievements, particularly in the area less dependent on social interaction, such as mathematics, engineering, physics and computer science. AS adult learners can contribute to society and should be acknowledged and given opportunities.

Therefore, in my opinion, in South Africa, based on our past and ongoing research, our objectives should be to develop instruments or tools which will assist in early and easy identification. Appropriate resources should be made available as well as properly trained personnel so that parents with AS learners have hope that their children will be able to develop to their optimum potential and live balanced and fulfilling lives.

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Appendix1 Letter from WCED granting permission.

Navrae Enquiries IMibuzo	**Dr RS Cornelissen**
Telefoon Telephone IFoni	**(021) 467-2286**
Faks Fax IFeksi	**(021) 425-7445**
Verwysing Reference ISalathiso	**20080829-0010**

Wes-Kaap Onderwysdepartement

Western Cape Education Department

ISebe leMfundo leNtshona Koloni

Ms Petronella De Jager
6 Castleman Road
FISH HOEK
7975

Dear Ms P. De Jager

RESEARCH PROPOSAL: THE IMPACT OF SENSORY PROCESSING DIFFICULTIES ON THE LEARNING AND DEVELOPMENT OF THREE LEARNERS WITH ASPERGER SYNDROME IN GRADE R.

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **1st September 2008 to 26th September 2008**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr R. Cornelissen at the contact numbers above quoting the reference number.
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:
    The Director: Research Services
    Western Cape Education Department
    Private Bag X9114
    CAPE TOWN
    8000

We wish you success in your research.

Kind regards.

Signed: Ronald S. Cornelissen
for: **HEAD: EDUCATION**
DATE: **29th August 2008**

MELD ASSEBLIEF VERWYSINGSNOMMERS IN ALLE KORRESPONDENSIE / PLEASE QUOTE REFERENCE NUMBERS IN ALL CORRESPONDENCE /
NCEDA UBHALE IINOMBOLO ZESALATHISO KUYO YONKE IMBALELWANO

GRAND CENTRAL TOWERS, LAER-PARLEMENTSTRAAT, PRIVAATSAK X9114, KAAPSTAD 8000
GRAND CENTRAL TOWERS, LOWER PARLIAMENT STREET, PRIVATE BAG X9114, CAPE TOWN 8000

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Appendix 2 (a) Permission letter to parents.

Mrs P. S. de Jager
Castleman Road
Fish Hoek
7975
Tel No: 0847045184

13 August 2008

Dear Parents/Guardian

<u>Request for permission to observe your child, who has been diagnosed with Asperger's Syndrome.</u>

I am currently affiliated with Cape Peninsula University of Technology where I am doing my Masters degree in Education. My research is on: "The impact of sensory processing difficulties on the learning and development of learners experiencing Asperger's Syndrome in Grade R".

I am led to understand that your child has been clinically diagnosed with Asperger's Syndrome and is at present attending a main-stream pre-primary school. I would like to obtain your permission, to observe your child, once a week during school time, during September 2008. I will be focussing on how his sensory processing skills are developing in a formal and informal environment at school.

I will require that you complete a consent form. All information obtained from my observation and interview with your child's educator will be kept strictly confidential.

Once your have given written permission, I will approach the Western Cape Education Department and the principal of the school, to obtain permission to conduct this research during September 2008.

This thesis, when completed, will be available for your personal view. Please note that nowhere in the thesis will your child's identity be revealed. Please contact me if you need any additional information regarding this research.

Yours sincerely

Mrs. P. S. de Jager

Appendix 2 (b) Consent from to parents.

Mrs P.S. De Jager
6 Castleman Road
FISH HOEK
7975
13 August 2008

RE: CONSENT FORM FOR PERMISSION TO OBSERVE YOUR CHILD, WHO HAS
BEEN DIAGNOSED WITH ASPERGER SYNDROME.

Dear Parents/Guardian

If you grant me permission to include your child in my research, please complete and sign
this form and post it as soon as possible to the above address. A self addressed envelope
has been included for your convenience. Alternatively I can pick it up from you at a pre-
arranged venue.

I... and ....give permission for
my

child .... to be included in the research on:

"The impact of sensory processing difficulties on the learning and development of learners
experiencing Asperger's Syndrome in Grade R"

APPENDIX 3 Interview schedule and questions for educator.

EDUCATORS NAME: DATE AND TIME OF INTERVIEW:

LEARNERS NAME: DATE OF BIRTH:

MAIN QUESTION	REASON FOR THE QUESTION	POSSIBLE PROBING QUESTIONS	BODY MOVEMENTS AND COMMENTS
1. What difficulties have you observed in learner, in relation to his gross motor skills development?	<u>Gross motor development</u> - Vestibular processing - Sensory processing related to endurance.	- Does he tire more easily than other learners? - Does he tend to walk on his toes? - Does he have difficulty with hopping, jumping and running compared to other learners? - Is he clumsy and does not know how to move his body? - Does he find gross	

		motor activities difficult? - Is he always in motion-Can't sit still? - Does he know his left from his right?	
2. What difficulties have you observed in learner in relation to his fine motor development?	<u>Fine motor development</u> and posture in relation to low or weak muscle tone.	- Does he have a poor posture? - Does he lean on his arm when working or has his head close to his work? - Is his colouring in, drawing and cutting age appropriate? - Does he have a poor pencil grip and pencil control? - Does he swap his hand around when working?	

MAIN QUESTION	FOR QUESTION	POSSIBLE PROBING QUESTIONS	BODY MOVEMENTS AND COMMENTS
3. What have you observed about the visual perceptual development of learner 1?	If the educator have observed any <u>Visual processing difficulties</u> - Concrete - semi- concrete - abstract	- Has his eyesight been tested and it's O.K. ? - Does he express discomfort with to much sunlight or bright lights? - Does he often cover his eyes to protect them? - Does he prefer to be in dark places? - Does he look carefully and stare at objects at close range? -- Does he have	

		difficulty with: (in group, one on one) visual sequencing, colour and shape recognition, visual memory building puzzles and visual closure?	
4. What have you observed about the auditory perceptual development of learner?	If the educator has observed any <u>auditory processing difficulties</u> - concrete -semi concrete - abstract	- Does he respond negatively to loud noises like music and thunder? - Does he often hold his hands over his ears to block out sound? - Does he make his own noises to block out other sounds? - Does he have trouble focussing on tasks because of	

| | | background noises?

- Does he appear not to hear or respond although his hearing is O.K.?

- How is his listening skills?

- Can he respond to more than one instruction?

- Does he have difficulties with: (in group, one on one)
- auditory sequencing, discrimination, memory, closure and symbol comprehension? | |

MAIN QUESTION	REASON FOR QUESTION	POSSIBLE PROBING QUESTIONS	BODY MOVEMENT AND COMMENTS
5. How do you perceive the learner 's tactile responses are towards his immediate environment?	To establish if the Educator has observed any <u>Tactile processing difficulties.</u>	- Is the learner over-sensitive to being touched? - Does he pull away from light touch? - Does he have trouble keeping his hands to himself? - Does he constantly have to touch something or some-one? - Till point of irritation? - Does he avoid messy activities? - Does he prefer long sleeve clothing?	

		- Can't stand near some-one or in a line? - Have trouble remaining in busy or group situation?	

MAIN QUESTION	REASON FOR QUESTION	POSSIBLE PROBING QUESTIONS	BODY MOVEMENT AND COMMENTS
6. How would you describe the emotional and social development of learner and his language and numeracy skills?	Impact the sensory processing can have on the <u>social, emotional, and learning development</u>	- Does he have a good self- esteem? - Does he often react immaturely for his age? - Find it difficult to make friend? - Have an immature attitude towards learning?	

		- Have difficulty sharing and waiting his turn? - Has difficulty controlling his feeling in a positive way? - Has unrealistic fears that interfere with his learning? - Avoids eye-contact? - Does not perceive body language and facial expressions? - Get over-sensitive and over serious? - Gets stressed out with change and different routines - <u>Does he have age appropriate:</u>	

		language usage deductive reasoning commands for words, vocabulary reasoning ability - <u>Does he have age appropriate:</u> mathematical concepts figure memory concept of time ability for problem-solving	
CONCLUSION		**EDUCATORS RESPONSE AND PERSONAL OPINION**	
In your opinion how do you think the learners sensory processing influences his learning and development?			

Appendix 4 Interview schedule and questions for psychologist.

Participant: Psychologist   **Location: Southern Suburbs, at her practice.**

Date: **Time:**

Main Question (Social Interaction)	Possible Probing Questions	**APPLICANT'S RESPONSES**
Who refers learners with AS to you?	Is it the principal of a school or is it the parents or house doctor?	
Why are these learners referred to you?	Is it mostly adaptability at school or does the home environment also play a role?	

How do you find these learner's social interaction?	1. Do they use gestures, facial expression and eye-to-eye gaze?	
	2. Can they follow social cues?	
	3.Do they share an activity easily?	
	4.Do they make friendships easily?	
	5. Do they respond to social praise or criticism?	
	6, Can they think and play creatively?	

Main Question (Social Communication)	Possible Probing Questions	APPLICANT'S RESPONSES
How do these learners respond in a group situation?	1. Do they participate verbally on their own? 2. Do they have to be prompted? 3. Does he keep to the topic?	
Can they follow through on verbal instructions?	1. Does the learner always understand the implied message? 2. Can they follow a sequence of events?	

Main Question (Social imagination and flexibility of thought)	Possible Probing Questions	**APPLICANT'S RESPONSES**
Do they always behave according to the situation?	1.Are there factors that stop them from responding appropriately? 2. Can they accept others point of view?	
Main Question (Motor and organisational skills.)	Possible probing Questions	**APPRLICANT'S RESPONSE**
How do they organise themselves around an environment?	1. Can he find his way around their environment? 2. Can they sit still without disturbing others?	

	3. Do they write legibly and draw accurately? 4. Can they organise themselves during physical activities?	
Main Question (General)	**Possible probing Questions**	**APPLICANT'S RESPONSES**
Can you name the settings where these learners show the most anxiety, stress and frustration?	When in a group? During free time? During independent work time?	

Can you prioritise the difficulties that cause you the greatest concern? Does sensory processing play a role?	When in a group? During free play? During independent time? What is the most common difficulties?	
Do you think if these factors, if addressed will assist learners with AS to function optimally in a mainstream school?	What is the reason for your answer? Yes/No?	
GENERAL COMMENTS	**PPROBING QUESTIONS**	**COMMENTS/RESPONSE**
Is their anything you can think of that you would like to add.	Can their be positive impacts through sensory processing?	

APPENDIX 5

OBSERVATION OF SENOSORY PROCESSING OF LEARNER 1 and 2

ENVIRONMENT AND CONTEXT – PHYSICAL	OBSERVATIION AND GENERAL COMMENTS		
What are the spacial engagement of the area?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free play – outdoor/ indoors			
What objects and people are present?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			

Creative activities			
Music and movement			
Micro activities			
Free play – outdoor and indoor.			
How is the area organised?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free play – outdoor and indoor.			

How easily can learners move in area?	DAY ONE	DAY TWO	DAY THREE
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free play indoor and outdoors			
What is the temperature?	DAY ONE	DAY TWO	DAY THREE
Discussion and story 'ring'			
Creative activities			
Micro activities			
Free play indoor and outdoor			

What is the noise level?	DAY ONE	DAY TWO	DAY THREE
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoor			
What time of day is it?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			

Free-play indoor and outdoor			

What odours are present?	DAY ONE	DAY TWO	DAY THREE
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoor			
What is the lightning source?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			

Music and movement			
Micro activities			
Free-play – indoor and outdoor			
How densely packed are people and objects?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play indoor and outdoor			

How visually stimulating is the area?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play indoor and outdoor			

ENVIRONMENT AND CONTEXT - CULTURAL	**OBSERVATION AND GENERAL COMMENTS**		
What is expected within this environment?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			

Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoor			
Are the expectations and rules of the environment clear?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			

Free-play indoor and outdoor			
How is the rules communicated? To the whole group/small groups/individually	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoor.			

ENVIRONMENT AND CONTEXT -SOCIAL	OBSERVATION AND GENERAL COMMENTS		
Who is with the learner?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			
With whom does the learner choose to interact?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			

Creative activities			
Music and movements			
Micro activities			
Free-play - indoor and outdoors			
Can he interact and perform tasks without assistance and encouragement?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			

Free-play – indoor and outdoors			
What kind of interaction occurs with his peers and adults?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'ring'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			

GROUP WORK AND TASKS	OBSERVATION AND GENERAL COMMENTS		
What is expected/ required from learner?	**DAY ONE**	**DAY TWO**	**DAY THREE**

Discussion and story 'ring'			
Creative activities			
Music and movement			
Micro activities			
Free-play - indoor and outdoors?			
Is the instructions clear and tasks understandable?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'ring'			
Creative activities			
Music and movement			

Micro activities			
Free-play – indoor and outdoors			
How is the instructions provided?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			
Does the task have a clear	**DAY ONE**	**DAY TWO**	**DAY THREE**

end and does the learner know when is is completed?			
Discussion and story ring			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			
Does the task have a clear sequence? How many steps are there?			
Discussion and story 'rings'			

Creative activities			
Music and movement			
Micro activities			
Free-play- indoor and outdoors.			
Is assistance available? What type?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'ring			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoor			

What materials are used?	DAY ONE	DAY TWO	DAY THREE
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play indoor and outdoors			
What are the sensory properties of the task and materials?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			

Music and movement			
Micro activities			
Free-play - indoor and outdoors			
How long is the group/ task time?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'ring'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			

LEARNER'S INTERACTION AND COMMUNICATION	OBSERVATION AND GENERAL COMMENTS		
What are the learner's strengths and difficulties?	DAY ONE	DAY TWO	DAY THREE
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			
What is the learner's willingness to participate?	DAY ONE	DAY TWO	DAY THREE
Discussion and story 'ring'			

Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			
What is his preferred modes of interaction and communication? **Does he imitate others?** **Does he make eye contact?**	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			

Micro activities			
Free-play – indoor and outdoors			
How is the learner's concentration and focus?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement?			
Micro activities			
Free-play – indoor and outdoors			

What does he enjoy and seek out?	DAY ONE	DAY TWO	DAY THREE
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoor			
What are the learner's specific behavioural concerns? When do they occur?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			

Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			
What calms and arouses the learner?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'ring'			
Creative activities			
Music and movement			
Micro activities			

Free-play – indoor and outdoors			
How does the learner deal with his distresses?	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'ring'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			

LEARNER'S REACTION TO SENSORY INPUT	OBSERVATION AND GENERAL COMMENTS		
Sound sensitivity/ Auditory difficulties	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play indoor and outdoors			

Tactile discrimination/ tactile difficulties	DAY ONE	DAY TWO	DAY THREE
Discussion and story 'ring'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			
Visual sensitivity/ visual difficulties	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'ring'			
Creative activities			

Music and movement			
Micro activities			
Free-play- indoor and outdoors			
Balance and movement sensitivities/vestibular difficulties	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'ring'			
Creative activities			
Music and movement			
Micro activities			

Free-play – indoor and outdoors.			
Olfactory and Dietary sensitivities	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'rings'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			
Perception of Pain	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'ring'			

Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			
Oral – motor skills	**DAY ONE**	**DAY TWO**	**DAY THREE**
Speech and language gestural vocabulary facial expression			
Discussion and story 'ring'			
Creative activities			

Music and movement			
Micro activities			
Free-play – indoor and outdoors			
Attention and organising behaviour	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'ring			
Creative activities			
Music and movement			
Micro activities			

Free-play- indoor and outdoors			
Emotional and social Responses	**DAY ONE**	**DAY TWO**	**DAY THREE**
Discussion and story 'ring'			
Creative activities			
Music and movement			
Micro activities			
Free-play – indoor and outdoors			

GENERAL COMMENTS AND REFLECTIONS ON THE DATA COLLECTED ON LEARNER ONE.

Appendix 6 NCS. OBE curriculum for Grade R

http://wced.wcape.gov.za/ncs/gradeR/grr_la.html

Revised National Curriculum Statement Grades R-9 (Schools)

Grade R

Select a Learning Area below to access the corresponding Outcomes and Assessment Standards for Grade R.

1. Arts and Culture
2. Economic & Management Sciences
3. Languages - Home Language
4. Languages - First Additional Language
5. Life Orientation
6. Mathematics
7. Natural Sciences
8. Social Sciences (History)
9. Social Sciences (Geography)
10. Technology

http://wced.wcape.gov.za/ncs/gradeR/grr_ac.html

Revised National Curriculum Statement Grade R-9 (Schools)

Grade R

Learning Area: Arts and Culture
(Further information on the Outcomes for this Learning Area)

Learning Outcome 1: Creating, Interpreting and Presenting

The learner will be able to create, interpret and present work in each of the art forms.

Organising Principle: The learner will be able to use play, fantasy and imagination to develop the skills and knowledge for creating and presenting the Arts.

Assessment standards

We know this when the learner:

- Dance
    - Through play, co-ordinates simple gross and fine motor movements, including crossing the mid-line.
    - Draws on play, fantasy and imagination to explore a wide variety of movement words, rhythms and changes in tempo.
    - Participates in simple dances based on formations and patterns.
- Drama
    - Uses voice and movement spontaneously when playing creative drama games.
    - Participates in make-believe situations based on imagination, fantasy and life experiences.
- Music
    - Sings and moves creatively to children's rhymes available in own environment.
    - Responds in movement to a variety of rhythms and changes in tempo in sounds, songs and stories.
- Visual Arts
    - Freely creates images of own world in various media.
    - Uses play and fantasy in two-dimensional and three-dimensional work.
    - Explores and experiments with a wide variety of art materials, techniques (including waste materials), and colour in a spontaneous and creative way.
    - Uses and co-ordinates motor skills in practical work and play (e.g. appropriate handling of scissors, glue applicators, paintbrush and drawing instruments).

Learning Outcome 2: Reflecting

The learner will be able to reflect critically and creatively on artistic and cultural processes, products and styles in past and present contexts.

Organising Principle: The learner will be able to think about and respond to artworks focusing on self and own environment.

Assessment standards

We will know this when the learner:

- Dance
    - Talks about own dancing using action words.
- Drama
    - Thinks about and shows how people and animals move.
    - Uses concrete objects to represent other objects in dramatic play.
- Music
    - Imitates a variety of natural sounds in own environment.

- Distinguishes between a talking voice and a singing voice.
  - Visual Arts
    - Talks about, shares and tells stories about own artwork with others.

Learning Outcome 3: Participating and Collaborating

The learner will be able to demonstrate personal and interpersonal skills through individual and group participation in Arts and Culture activities.

Organising Principle: The learner will be able to participate and co-operate in art activities to develop awareness of self and others in own environment.

Assessment standards

We know this when the learner:

- Dance
  - Responds to movement instructions that cover space without bumping or hurting others when moving forwards and backwards.
- Drama
  - Participates in drama games - takes turns, waits for signals, responds to cues, and shares space.
  - Begins to develop empathy by assuming a variety of familiar roles.
- Music
  - Brings songs from home and shares them with others.
- Visual Arts
  - Demonstrates active involvement in individual and group art-making activities and an ability to share art-making equipment.

Learning Outcome 4: Expressing and Communicating

The learner will be able to analyse and use multiple forms of communication and expression in Arts and Culture.

Organising Principle: The learner will be able to explore, express and communicate personal stories and responses to stories and ideas in own environment.

Assessment standards

We know this when the learner:

- Dance
  - Expresses ideas and stories creatively through movement activities that are guided but open-ended.
- Drama
  - Conveys feelings and ideas through facial expression and gesture.
  - Creates sound effects to accompany stories told by the teacher.
- Music
  - Listens and moves creatively to music, stories, songs and sounds.
- Visual Arts
  - Responds to what the learner sees, perceives and experiences in own natural and constructed environment.

http://wced.wcape.gov.za/ncs/gradeR/grr_ac.html

Revised National Curriculum Statement Grade R-9 (Schools)

Grade R

Learning Area: Economic and Management Sciences
(Further information on the Outcomes for this Learning Area)

Learning Outcome 1: The Economic Cycle

The learner will be able to demonstrate knowledge and understanding of the economic cycle within the context of 'the economic problem'.

Assessment standards

We know this when the learner:

- Identifies own personal role in the home as a consumer.
- Recognises that advertisements influence personal needs and wants.
- Explores and begins to understand the notions of bartering and money and its uses.
- Recognises that a household consists of people who must live and work together within a framework of rules (concepts of 'fair' and 'unfair' rules).

Learning Outcome 2: Sustainable Growth and Development

The learner will be able to demonstrate an understanding of sustainable growth, reconstruction and development, and to reflect critically on its related processes.

Assessment standards

We know this when the learner:

- Differentiates between play and useful tasks at home.
- Relates stories of responsibilities at home.
- Recognises the need to do things well and to be committed.
- Participates in creative activities that will stimulate entrepreneurial thinking (e.g. drawing, cutting, singing, playing, talking).

http://wced.wcape.gov.za/ncs/gradeR/grr_lang.html

Revised National Curriculum Statement Grade R-9 (Schools)

Grade R

Learning Area: Languages - Home Language
(Further information on the Outcomes for this Learning Area)

Learning Outcome 1: Listening

The learner will be able to listen for information and enjoyment, and respond appropriately and critically in a wide range of situations.

Assessment standards

We know this when the learner:

- Listens attentively to questions, instructions and announcements, and responds appropriately.
- Demonstrates appropriate listening behaviour by listening without interrupting, showing respect for the speaker, and taking turns to speak.
- Listens with enjoyment to oral texts (simple songs, rhymes, short poems and stories), and shows understanding:
    - acts out parts of the story, song or rhyme;
    - joins in choruses at the appropriate time;
    - draws a picture of the story, song or rhyme;
    - notes details and gives the main idea of an oral text;
    - puts pictures in the right sequence.
- Develops phonic awareness:
    - recognises that words are made up of sounds;
    - distinguishes between different sounds, especially at the beginning and ends of words;
    - segments oral sentences into individual words (using words of one syllable at first);
    - segments spoken multi-syllabic words into syllables (e.g. ba-na-na) using clapping or drumbeats;
    - recognises some rhyming words in common rhymes and songs such as 'We 're going to the zoo, zoo, zoo; you can come too, too, too'.

Learning Outcome 2: Speaking

The learner will be able to communicate confidently and effectively in spoken language in a wide range of situations.

Assessment standards

We will know this when the learner:

- Talks about family and friends.
- Expresses own feelings and the feelings of real or imaginary people.
- Sings and recites simple songs and rhymes.
- Uses language imaginatively for fun and fantasy (e.g. to make up rhyming words).
- Asks questions when the learner does not understand or needs more information, and responds clearly to questions asked of the learner.
- Passes on messages.
- Recounts own personal experiences.
- Tells own stories and retells stories of others in own words.
- Participates confidently and fluently in a group.
- Shows sensitivity when speaking to others.
- Role-plays different kinds and manners of speech (e.g. telephone conversation).

Learning Outcome 3: Reading and Viewing

The learner will be able to read and view for information and enjoyment, and respond critically to the aesthetic, cultural and emotional values in texts.

Assessment standards

We know this when the learner:

- Uses visual and pictorial cues to make meaning:
    - looks carefully at pictures and photographs to recognise common objects and experiences;
    - identifies a picture or figure from the background;
    - makes sense of picture stories;
    - matches pictures and words;
    - uses illustrations to understand simple captions in story books.
- Role-plays reading:
    - holds a book the right way up, turns pages appropriately, looks at words and pictures and understands the relationship between them, and uses pictures to construct ideas;
    - distinguishes pictures from print (e.g. by pointing at words rather than pictures when 'reading').
- Makes meaning of written text:
    - understands the purpose of print - that it carries meaning (e.g. that a written word can signify own name);
    - 'reads' in a group with the teacher;
    - makes links to own experience when reading with the teacher, viewing television or pictures;
    - describes and gives opinions of characters in stories or television programmes.
- Starts recognising and making meaning of letters and words:
    - recognises that written words refer to spoken words;
    - recognises and reads high frequency words such as own name and print in the environment such as 'STOP';
    - 'reads' picture books with simple captions or sentences.
- Begins to develop phonic awareness:
    - recognises initial consonant and short vowel sounds;
    - recognises and names some common letters of the alphabet such as the letter the learner's name begins with;
    - recognises some rhyming words in common rhymes and songs such as 'We 're going to the zoo, zoo, zoo; you can come too, too, too'.

Learning Outcome 4: Writing

The learner will be able to write different kinds of factual and imaginative texts for a wide range of purposes.

Assessment standards

We know this when the learner:

- Experiments with writing:
    - creates and uses drawings to convey a message, and as a starting point for writing;
    - forms letters in various ways (e.g. by using own body to show the shapes, writing in sand);
    - understands that writing and drawing are different;
    - 'writes' and asks others to give the meaning of what has been written;
    - talks about own drawing and 'writing';
    - role-plays 'writing' for a purpose (e.g. telephone message, shopping list);
    - uses known letters and numerals (or approximations) to represent written language, especially letters from own name and age;
    - 'reads' own emerging writing when asked to do so;
    - shows in own writing attempts, beginning awareness of directionality (e.g. starting from left to right, top to bottom);
    - copies print from the environment (e.g. labels on household items, advertisements);
    - makes attempts at familiar forms of writing, using known letters (e.g. in lists, messages or letters);

- manipulates writing tools like crayons and pencils.

Learning Outcome 5: Thinking and Reasoning

The learner will be able to use language to think and reason, as well as to access, process and use information for learning.

Assessment standards

We know this when the learner:

- Uses language to develop concepts:
    - demonstrates developing knowledge of concepts such as quantity, size, shape, direction, colour, speed, time, age, sequence.
- Uses language to think and reason:
    - identifies and describes similarities and differences;
    - matches things that go together, and compares things that are different;
    - classifies things (e.g. puts all toys in box, books on shelves, crayons in tins);
    - identifies parts from the whole (e.g. parts of the body).
- Uses language to investigate and explore:
    - asks questions and searches for explanations;
    - gives explanations and offers solutions;
    - offers explanations and solutions;
    - solves and completes puzzles.
- Processes information:
    - picks out selected information from a description.

Learning Outcome 6: Language Structure and Use

The learner will know and be able to use the sounds, words and grammar of the language to create and interpret texts.

Assessment standards

We know this when the learner:

- Relates sounds to letters and words:
    - recognises that words are made up of sounds;
    - recognises the sounds at the beginnings of some words.
- Works with words:
    - groups words (e.g. words which rhyme);
    - identifies a word, a letter and a space in print.
- Works with sentences:
    - communicates ideas using descriptions and action words.
- Works with texts:
    - talks about texts (e.g. stories) using terms like 'beginning', 'middle' and 'end'.
- Uses meta-language (e.g. sound, word, letter, rhyme, beginning, middle, end).

http://wced.wcape.gov.za/ncs/gradeR/grr_lang1.html

Revised National Curriculum Statement Grade R-9 (Schools)

Grade R

Learning Area: Languages - First Additional Language
(Further information on the Outcomes for this Learning Area)

Learning Outcome 1: Listening

The learner will be able to listen for information and enjoyment, and respond appropriately and critically in a wide range of situations.

Assessment standards

We know this when the learner:

- Understands short, simple, dramatised stories:
    - joins in choruses at appropriate points (e.g. 'He huffs and he puffs and he blows the house down.');
    - draws a picture of the story;
    - connects the story to own life, with discussion in the home language.
- Understands simple oral instructions by responding physically (e.g. 'Come here, please.').
- Shows respect for classmates by giving them a chance to speak, and by listening to them.

Learning Outcome 2: Speaking

The learner will be able to communicate confidently and effectively in spoken language in a wide range of situations.

Assessment standards

We know this when the learner:

- Uses and responds appropriately to simple greetings and farewells, and thanks people.
- Memorises and performs songs and action rhymes with the right intonation, rhythm and pronunciation.
- Uses polite forms such as 'please', 'thank you', and 'sorry'.

Learning Outcome 3: Reading and Viewing

The learner will be able to read and view for information and enjoyment, and respond critically to the aesthetic, cultural and emotional values in texts.

Assessment standards

We know this when the learner:

- Recognises some high-frequency words in the media (brand names) and the environment ('STOP', 'GO').
- Reads picture books.
- Names the sound own name begins with (first step in phonemic awareness).
- Learns rhymes and songs which develop phonemic awareness (e.g. 'We're going to the zoo, zoo, zoo; you can come too, too, too.').

Learning Outcome 4: Writing

The learner will be able to write different kinds of factual and imaginative texts for a wide range of purposes.

Assessment standards

We know this when the learner:

- Draws pictures on which the teacher writes labels.
- Understands that writing and drawing are different.
- Understands the purpose of writing - that it carries meaning.
- Copies simple words already known orally.
- Makes attempts at writing, such as trying to write own name.

Learning Outcome 5: Thinking and Reasoning

The learner will be able to use language to think and reason, as well as to access, process and use information for learning.

Assessment standards

We know this when the learner:

- Understands concepts and some vocabulary relating to:
  - identity (e.g. 'My name is...');
  - number (e.g. one, two);
  - size (e.g. big, small);
  - colour (e.g. red, yellow).
- Identifies similarities (e.g. by responding to an instruction such as 'Put all the yellow ones together.').

Learning Outcome 6: Language Structure and Use

The learner will know and be able to use the sounds, words and grammar of the language to create and interpret texts.

Assessment standards

We know this when the learner:

- Shows some understanding of question forms in oral texts (e.g. 'What...?', 'Who...?', 'How many/much/old etc....?', 'Which...?', 'Can....?').
- Shows some understanding of the simple present and present progressive tenses in oral texts (e.g. 'She likes school.' 'He is reading.').
- Shows some understanding of imperatives in oral texts (e.g. 'Come here.' 'Don't sit down.').
- Shows some understanding of modal verbs in oral texts (e.g. 'I can skip/run/jump.').
- Shows some understanding of negative forms in oral texts (e.g. 'I don't like meat.' 'I can't swim.').
- Shows some understanding of plurals of nouns (e.g. book, books), including some irregular forms (e.g. tooth, teeth) in oral texts.
- Shows some understanding of personal pronouns in oral texts (e.g. I, he, she, you, we, they).
- Shows some understanding of prepositions in oral texts (e.g. in, at, on, to).
- Shows some understanding of adjectives (e.g. big, small) and adverbs (e.g. slowly, quickly) in oral texts.
- Understands between 200 and 500 common words in oral texts in context.

http://wced.wcape.gov.za/ncs/gradeR/grr_lo.html

Revised National Curriculum Statement Grade R-9 (Schools)

Grade R

Learning Area: Life Orientation
(Further information on the Outcomes for this Learning Area)

Learning Outcome 1: Health Promotion

The learner will be able to make informed decisions regarding personal,community and environmental health.

Assessment standards

We know this when the learner:

- Explains the importance of drinking only clean water and eating fresh food.
- Describes steps that can be taken to ensure personal hygiene.
- Demonstrates precautions against the spread of communicable diseases.
- Explains safety in the home and at school.
- Explains the right of children to say 'no' to sexual abuse, and describes ways in which to do so.

Learning Outcome 2: Social Development

The learner will be able to demonstrate an understanding of and commitment to constitutional rights and responsibilities, and to show an understanding of diverse cultures and religions.

Assessment standards

We know this when the learner:

- Identifies basic rights and responsibilities in the classroom.
- Recognises the South African flag.
- Knows members of own family,peers and caregivers.
- Listens to and retells a story with a moral value from own culture.
- Identifies and names symbols linked to own religion.

Learning Outcome 3: Personal Development

The learner will be able to use acquired life skills to achieve and extend personal potential to respond effectively to challenges in his or her world.

Assessment standards

We know this when the learner:

- Says own name and address.
- Describes what own body can do.
- Expresses emotions without harming self, others or property.
- Adjusts to classroom routine and follows instructions.

Learning Outcome 4: Physical Development and Movement

The learner will be able to demonstrate an understanding of,and participate in, activities that promote movement and physical development.

Assessment standards

We know this when the learner:

- Plays running, chasing and dodging games using space safely.

- Explores different ways to locomote, rotate, elevate and balance.
- Performs expressive movements using different parts of the body.
- Participates in free play activities.

http://wced.wcape.gov.za/ncs/gradeR/grr_maths.html

Revised National Curriculum Statement Grades R-9 (Schools)

Grade R

Learning Area: Mathematics
([Further information on the Outcomes for this Learning Area](#))

Learning Outcome 1: Numbers, Operations and Relationships

The learner will be able to recognise, describe and represent numbers and their relationships, and to count, estimate, calculate and check with competence and confidence in solving problems.

Assessment standards

We know this when the learner:

- Counts to at least 10 everyday objects reliably.
- Says and uses number names in familiar contexts.
- Knows the number names and symbols for 1 to 10.
- Orders and compares collections of objects using the words 'more', 'less' and 'equal'.
- Solves and explains solutions to practical problems that involve equal sharing and grouping with whole numbers of at least 10 and with solutions that include remainders.
- Solves verbally-stated additions and subtraction problems with single-digit numbers and with solutions to at least 10.
- Uses the following techniques:
    - building up and breaking down numbers to at least 10;
    - doubling and halving to at least 10;
    - using concrete apparatus (e.g. counters).
- Explains own solutions to problems.

Learning Outcome 2: Patterns, Functions and Algebra

The learner will be able to recognise, describe and represent patterns and relationships, as well as to solve problems using algebraic language and skills.

Assessment standards

We know this when the learner:

- Copies and extends simple patterns using physical objects and drawings (e.g. using colours and shapes).
- Creates own patterns.

Learning Outcome 3: Space and Shape (Geometry)

The learner will be able to describe and represent characteristics and relationships between two-dimensional shapes and three-dimensional objects in a variety of orientations and positions.

Assessment standards

We know this when the learner:

- Recognises, identifies and names three-dimensional objects in the classroom and in pictures, including:
    - boxes (prisms);
    - balls (spheres).
- Describes, sorts and compares physical three-dimensional objects according to:
    - size;

- objects that roll;
- objects that slide.
- Builds three-dimensional objects using concrete materials (e.g. building blocks).
- Recognises symmetry in self and own environment (with focus on front and back).
- Describes one three-dimensional object in relation to another (e.g. 'in front of' or 'behind').
- Follows directions (alone and/or as a member of a group or team) to move or place self within the classroom (e.g. 'at the front'or 'at the back').

Learning Outcome 4: Measurement

The learner will be able to use appropriate measuring units, instruments and formulae in a variety of contexts.

Assessment standards

We know this when the learner:

- Describes the time of day in terms of day or night.
- Orders recurring events in own daily life.
- Sequences events within one day.
- Works concretely comparing and ordering objects using appropriate vocabulary to describe:
    - mass (e.g. light, heavy, heavier);
    - capacity (e.g. empty, full, less than, more than);
    - length (e.g. longer, shorter, wider, tall, short).

Learning Outcome 5: Data Handling

The learner will be able to collect, summarise, display and critically analyse data in order to draw conclusions and make predictions, and to interpret and determine chance variation.

Assessment standards

We know this when the learner:

- Collects physical objects (alone and/or as a member of a group or team) in the environment according to stated features (e.g. collects 10 dead flowers).
- Sorts physical objects according to one attribute (property) (e.g. red shapes).
- Draws a picture as a record of collected objects.
- Answers questions (e.g. 'Which has the most...?') based on own picture or own sorted objects.

http://wced.wcape.gov.za/ncs/gradeR/grr_ns.html

Revised National Curriculum Statement Grades R-9 (Schools)

Grade R

Learning Area: Natural Sciences
(Further information on the Outcomes for this Learning Area)

Learning Outcome 1: Scientific Investigations

The learner will be able to act confidently on curiosity about natural phenomena, and to investigate relationships and solve problems in scientific, technological and environmental contexts.

Assessment standards

We know this when the learner:

- **Plans: Contributes towards planning an investigative activity.**

  Achievement is evident when the learner, for example,
  - asks and answers questions about the investigation, using 'show and tell 'or stories to say what action is planned.

- **Does: Participates in planned activity.**

  Achievement is evident when the learner, for example,
  - follows simple instructions with assistance;
  - explains what is being done or played (e.g. games according to the rules).

- **Reviews: Thinks and talks about what has been done.**

  Achievement is evident when the learner, for example,
  - uses simple words, pictures or other items with assistance to explain what has been done.

http://wced.wcape.gov.za/ncs/gradeR/grr_ss1.html

Revised National Curriculum Statement Grades R-9 (Schools)

Grade R

Learning Area: Social Sciences (History)
(Further information on the Outcomes for this Learning Area)

Learning Outcome 1: Historical Enquiry

The learner will be able to use enquiry skills to investigate the past and present.

Assessment standards

We know this when the learner:

- Answers simple questions about stories of the past [answers the question].
- Retells stories about the past and draws pictures illustrating these stories [communicates the answer].

Learning Outcome 2: Historical Knowledge and Understanding

The learner will be able to demonstrate historical knowledge and understanding.

Assessment standards

We know this when the learner:

- Discusses personal experiences in the past and present [chronology and time].
- Discusses own age in years [chronology and time].

Learning Outcome 3: Historical Interpretation

The learner will be able to interpret aspects of history.

Assessment standards

We know this when the learner:

- Responds to stories about the past (e.g. listens to a story about the past and makes comments) [source interpretation].

http://wced.wcape.gov.za/ncs/gradeR/grr_ss2.html

Revised National Curriculum Statement Grades R-9 (Schools)

Grade R

Learning Area: Social Sciences (Geography)
(Further information on the Outcomes for this Learning Area)

Learning Outcome 1: Geographical Enquiry

The learner will be able to use enquiry skills to investigate geographical and environmental concepts and processes.

Assessment standards

We know this when the learner:

>   (There are no Assessment Standards for this Learning Outcome in Grade R.)

Learning Outcome 2: Geographical Knowledge and Understanding

The learner will be able to demonstrate geographical and environmental knowledge and understanding.

Assessment standards

We know this when the learner:

- Discusses personal experiences of familiar places [people and places].

Learning Outcome 3: Exploring Issues

The learner will be able to make informed decisions about social and environmental issues and problems.

Assessment standards

We know this when the learner:

>   (There are no Assessment Standards for this Learning Outcome in Grade R.)

http://wced.wcape.gov.za/ncs/gradeR/grr_tech.html

Revised National Curriculum Statement Grades R-9 (Schools)

Grade R

Learning Area: Technology
(Further information on the Outcomes for this Learning Area)

Learning Outcome 1: Technological Processes and Skills

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.

Assessment standards

We know this when the learner:

Investigates
- Physically manipulates products to explore their shape, size, colour and the materials they are made of.

Designs
- Chooses from a given range, materials or substances that can be used to make simple products.

Makes
- Makes simple products from a range of materials provided.

Evaluates
- Expresses own feelings about the products made.

APPENDIX 7 Critical and developmental outcomes.

(Firmani et al., 2003: 6).

Understanding curriculum terminology

Outcomes-based education (OBE)

In OBE you begin by thinking about the outcome – in other words, what learners will be able to do, know and value as a result of their experience of learning and teaching. This is different from beginning with what educators will teach.

By starting with the outcome, educators think about learning as a whole: what knowledge and skills need to be learned, and what values and attitudes will lead to the successful achievement of the outcome.

Critical and developmental outcomes

There are specific outcomes clearly written into the new curriculum that describe the type of learner our new education and training system aims to create. These outcomes are called critical and developmental outcomes.

Critical outcomes picture learners who will be able to:

- identify and solve problems; make decisions using critical and creative thinking
- work effectively with others as members of a team, organisation and community
- organise and manage themselves and their activities responsibly and effectively collect, analyse, organise and critically evaluate information
- communicate effectively using visual, symbolic and/or language skills in various modes
- use science and technology effectively and critically, showing responsibility towards the environment and health of others
- demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.

Developmental outcomes picture learners who are able to:

- reflect on and explore a variety of strategies to learn effectively
- participate as responsible citizens in the life of local, national and global communities
- be culturally and aesthetically sensitive across a range of social contexts
- explore education and career opportunities
- develop entrepreneurial opportunities.

Assessment standards

Assessment standards describe the level at which learners show their mastering of the learning outcomes and the ways in which they demonstrate their achievements. They are not be used to prescribe content or method.