


**THE RELATIONSHIP BETWEEN SENSORY INTEGRATIVE  
PROFILES AND ACADEMIC ACHIEVEMENT OF  
FIRST YEAR HEALTH SCIENCES STUDENTS AT  
THE UNIVERSITY OF THE WESTERN CAPE**

**KULSUM BAGUS**



**A thesis submitted in fulfilment of the requirements for  
the degree of Magister Scientiae Occupational Therapy  
in the Department of Occupational Therapy,  
University of the Western Cape**

**Supervisor: Prof. Lisa Wegner**

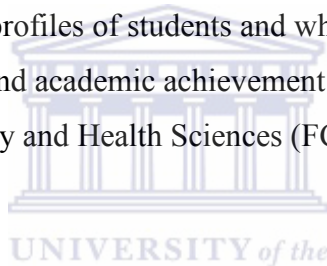
**Co-supervisor: Dr. Firdouza Waggie**

**May 2012**

## ABSTRACT

“Sensation is the common language by which we share the experience of being human; it provides a common ground for understanding” (Dunn, 2001, p.608).

There is a high incidence of dropout in the first year of university studies. Some of the main reasons were attributed to adjustment or adaptation difficulties experienced by the new students which impacted on academic achievement. Much of this difficulty relates to the need to find their identity in relation to the new university environment with new rules, peers, and expectations. The acquisition of a sensory integrative (SI) profile could shed light on an element of the student’s identity. However, very little is known about the relationship between the SI profile and academic achievement. Therefore, the aim of the study was to determine the SI profiles of students and whether there was a relationship between the SI profiles and academic achievement of first year students from the Faculty of the Community and Health Sciences (FCHS) at the University of the Western Cape (UWC).



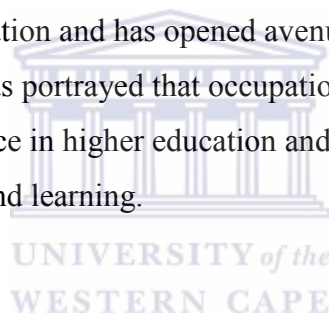
The study followed the quantitative research paradigm and was more specifically a descriptive, cross-sectional study. Measurements included a demographic questionnaire to gather socio-demographic data, as well as the Adolescent and Adult Sensory Profile questionnaire to determine the SI profiles of the students. These instruments were administered to a sample of 357 registered first year students from the FCHS at UWC. Matriculation academic marks, as well as first year university academic marks were obtained and utilised for analysis. The SPSS statistical package was utilised for descriptive and inferential statistical analyses of the data.

The results of the study indicated that the SI profiles of the first year FCHS students were that they responded “similarly to most people” on each of the four sensory quadrants of Dunn’s (1997) Model of Sensory Processing. Secondary analyses were implemented by means of a collapsing mechanism to denote more specific results of the SI profiles. This analysis revealed that the students tended

to have low thresholds for their neurological and behavioural continua of sensory processing.

The inferential analyses that were implemented to determine whether there was a relationship between the SI profiles and academic achievement of the first year students yielded no statistical relationship between those variables. The analyses revealed relationships between the SI profiles and certain socio-demographic factors, such as age, race, and course of study.

In conclusion, the research study uncovered the SI profiles of the first year university student sample, relationships between the SI profiles and socio-demographics and disproved a relationship between SI profiles and academic achievement. The study was therefore of value to the professions of occupational therapy and higher education and has opened avenues for further exploration. Furthermore the study has portrayed that occupational therapy tools and SI profiles could have a place in higher education and in relation to student development, teaching and learning.



## **KEYWORDS**

Academic achievement  
Behavioural responses  
First year students  
Health sciences  
Neurological thresholds  
Sensory integration  
Sensory integrative profiles  
Sensation seeking  
Student support  
University setting

## DECLARATION

I declare that *The Relationship between Sensory Integrative Profiles and Academic Achievement of First Year Health Sciences Students at the University of the Western Cape* is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Kulsum Bagus



May 2012

Signed: .....

## ACKNOWLEDGEMENTS

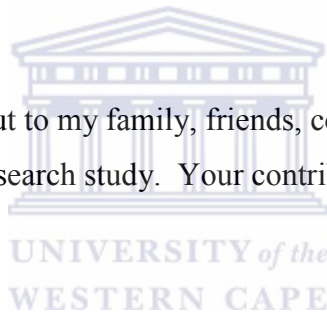
I would like to start off acknowledging that all my achievements have been at the hand of the Almighty.

My research study is dedicated to my parents, whose unwavering support allowed me to achieve my academic goals.

I would like to express sincere gratitude to my research supervisors, Prof. Lisa Wegner and Dr. Firdouza Waggie.

Thank you for the financial assistance by means of the National Research Foundation (NRF).

My heartfelt thanks go out to my family, friends, colleagues, fellow students and the participants of this research study. Your contribution, no matter how big or small, meant a lot to me.



I would like to acknowledge and thank the following people, listed in random order:

Gerard Filies, Aziza Kalam, Melissa Brown, Michelle Wentworth, Joey Munsamy, Sharmila Chibba, Shernel Wright, Aqeelah Mukadam, Inshaaf Evans, Annemarie Lombard, Lindsey Nicholls, Ernesta Kunneka, Julie Phillips, Patricia Struthers, Wendy McMillan, Abduraghiem Latief, Al Gasim, Sarah Dewing, Raphael Machesa, Austin Ngoma, Ayesha Noordien, Yusrah Salie, Monique Bennett, Prof. David Fisher, my friends at the UWC Department of Medical Biosciences, and with special thanks to Prof. Donavon Hiss and Randall Fisher.

Special thanks to Mr. Fisher, Dr. Philander, Erna Loubser and my colleagues at Athlone School for the Blind for their support of my studies.

# TABLE OF CONTENTS

<b>TITLE PAGE</b>	
<b>ABSTRACT</b>	<b>ii</b>
<b>KEYWORDS</b>	<b>iii</b>
<b>DECLARATION</b>	<b>iv</b>
<b>ACKNOWLEDGEMENTS</b>	<b>v</b>
<b>TABLE OF CONTENTS</b>	<b>vi</b>
<b>LIST OF APPENDICES</b>	<b>xii</b>
<b>LIST OF FIGURES</b>	<b>xiii</b>
<b>LIST OF TABLES</b>	<b>xiv</b>
<b>ABBREVIATIONS</b>	<b>xv</b>
<b>CHAPTER 1 INTRODUCTION</b>	
1.1. Introduction	1
1.2. Education	1
1.3. Historical background of UWC	2
1.4. First year students at UWC	3
1.5. Academic development	4
1.6. Sensory integration	6
1.7. Occupation of students	7
1.8. Framework	9
1.9. Researcher motivation	10
1.10. Overview of the thesis	12



## CHAPTER 2 LITERATURE REVIEW

2.1. Introduction	14
2.2. Person	14
2.2.1. Students entering university	14
2.2.2. Student failure and drop out	15
2.2.3. Age, stage and identity of first year students	17
2.2.3.1. Development of occupational identity	17
2.2.3.2. Benefits of awareness of occupational identity	18
2.2.3.3. The Y generation	19
2.2.4. Learning at a higher education institution	20
2.2.4.1. Learning theory	20
2.2.4.2. Learning styles	22
2.2.4.3. Other learning concepts and intelligences	26
2.2.5. Academic success of students	27
2.2.6. Under-preparedness of students	29
2.2.7. Factors affecting students	30
2.2.7.1. Positive psychology	32
2.2.7.2. The Circle of Courage	32
2.2.8. Sensory Integration	33
2.2.8.1. Viewpoints of the field of Sensory Integration	36
2.2.8.2. Senses	38
2.2.8.3. Sensory Processing	41
2.2.8.4. Model of Sensory Processing	43
2.2.8.4.(i). Behavioural characteristics	46

2.2.8.5. Sensory Profile for adolescents and adults	48
2.2.8.6. The AASP in research	50
2.2.8.7. Sensory Profile for children	54
2.2.9. Summary about the ‘person’ construct	60
2.3. Environment	61
2.4. Occupation	62
2.4.1. Occupational beings	62
2.4.2. Occupational performance	63
2.5. Summary of chapter	64
<b>CHAPTER 3 RESEARCH DESIGN AND METHODOLOGY</b>	
3.1. Introduction	65
3.2. Research Aim	65
3.3. Research Objectives	65
3.3.1. Variables	65
3.4. Research Design	66
3.4.1. Research paradigm	66
3.5. Research Methods	69
3.5.1. Setting	69
3.5.2. Population and sample	69
3.5.2.1. Sampling procedure	70
3.5.3. Instrument	71
3.5.3.1. Adaptations to Instrument	72
3.5.4. Reliability and validity of instrument	72





3.6. Procedure	76
3.6.1. Pilot study	76
3.6.2. Use of palm-pilots	77
3.6.3. Data collection procedure	78
3.7. Analysis of Data	81
3.8. Ethical Procedure	85

## **CHAPTER 4 RESULTS**

4.1. Introduction	86
4.2. Demographics of sample	86
4.2.1. Professional Programmes	86
4.2.2. Gender	87
4.2.3. Race	87
4.2.4. Age	90
4.2.5. Living arrangements while studying	90
4.2.6. Home classification / background	91
4.2.7. Summary of the demographic information	91
4.3. Academic Achievement	91
4.3.1. Matriculation marks (Grade 12)	92
4.3.1.1. English	92
4.3.1.2. Mathematics	93
4.3.2. University marks	95
4.4. Associations between academic achievement variables	96
4.4.1. First year university results: PHC and IPOC	96
4.4.2. First year university results: Attendance and IPOC	96

4.4.3. Matriculation marks (Mathematics) and First year university marks	97
4.4.4. Matriculation marks (English) and First year university marks	97
4.5. Sensory Integrative profiles	98
4.5.1. Overview of quadrant results	98
4.5.2. Quadrant 1 (Low Registration)	99
4.5.3. Quadrant 2 (Sensation Seeking)	100
4.5.4. Quadrant 3 (Sensory Sensitivity)	100
4.5.5. Quadrant 4 (Sensation Avoiding)	101
4.5.6. Summary of SI profile descriptions	103
4.6. Associations between SI profiles and socio-demographics	105
4.6.1. SI profiles and academic programme	105
4.6.2. SI profiles and gender	105
4.6.3. SI profiles and race	106
4.6.4. SI profiles and residence	106
4.6.5. SI profiles and home environment	106
4.6.6. SI profiles and age	107
4.6.7. Summary	107
4.7. Relationship between SI profiles and academic achievement	108
4.7.1. SI profiles and university marks	108
4.7.1.1. PHC and SI profiles	108
4.7.1.2. IPOC and SI profiles	109
4.7.1.3. Attendance and SI profiles	109
4.7.2. SI profiles and matriculation (grade 12) marks	110

4.7.2.1. Grade level of Mathematics and SI profiles	110
4.7.2.2. Mathematics marks and SI profiles	110
4.8. Summary of chapter	111
 <b>CHAPTER 5 DISCUSSION</b>	
5.1. Introduction	112
5.2. Demographics of sample	112
5.2.1. Relationship between socio-demographic variables and SI profiles	113
5.3. Academic achievement of first year CHS students	116
5.3.1. Relationship between academic achievement variables and SI profiles	118
5.4. Sensory Integrative profiles of first year CHS students	118
5.5. Limitations	122
5.7. Summary of chapter	123
 <b>CHAPTER 6 RECOMMENDATIONS AND CONCLUSION</b>	
6.1. Summary of the research study	124
6.2. Recommendations	124
6.2.1. Recommendations regarding future research	124
6.2.2. Recommendations for teaching and learning	125
6.2.3. Recommendations for student support	125
6.3. Conclusion	126
 <b>REFERENCES</b>	 <b>127</b>

## **LIST OF APPENDICES**

Appendix 1. Sensory Profile 2008 Codebook	143
Appendix 2. Information Sheet	153
Appendix 3. Consent form	155



## LIST OF FIGURES

Figure 1.1. Person-Environment-Occupation (PEO) Model	10
Figure 3.1. Quadrant Summary Chart	82
Figure 3.2. Collapsing mechanism for Cluster distributions	83
Figure 4.1. Age distribution of sample	90
Figure 4.2. Results according to the Quadrant Summary Chart	104



## LIST OF TABLES

Table 1. Dunn's Model of Sensory Processing	44
Table 4.1. Number of students in population and sample, stratified by professional programmes	87
Table 4.2. Racial breakdown of sample, stratified by professional programmes	89
Table 4.3. Matriculation (Grade 12) results	94
Table 4.4. SI Profile tendency scores	99
Table 4.5. SI Profile tendencies of sample	102
Table 4.6. Results of associations between SI profiles and socio-demographics	107



## ABBREVIATIONS

AASP	Adolescent and Adult Sensory Profile
ADHD	Attention Deficit Hyperactivity Disorder
EHP	Ecology of Human Performance
ELT	Experiential Learning Theory
ESP	Extrasensory perception
FCHS	Faculty of Community and Health Sciences
ICS	Information and Communication Services
IPOC	Introduction to Philosophy of Care
ITLU	Interdisciplinary Teaching and Learning Unit
LSAT	Learning Style Assessment Tool
OCD	Obsessive-compulsive disorder
ODPA	Office of Development and Public Affairs
PEO	Person-Environment-Occupation
PHC	Primary Health Care
SD	Sensory defensive disorder

SEQ	Sensory Experiences Questionnaire
SI	Sensory Integration
SPSS	Statistical Package for Social Sciences
UWC	University of the Western Cape





# CHAPTER ONE

## INTRODUCTION

### 1.1. Introduction

The aim of the study was to determine the sensory integrative (SI) profiles of students, and determine whether there was a relationship between the SI profiles and academic achievement of first year students from the Faculty of the Community and Health Sciences (FCHS) at the University of the Western Cape (UWC). In Chapter One, the concepts of sensory integrative profiles, academic achievement, first year university students as well as the UWC, will be discussed. The researcher's motivation for conducting this study will be revealed. Relevant literature from the fields of Education and Occupational Therapy that relates to the research area will be presented, together with the framework that will be used to present the Literature Review.



### 1.2. Education

Education forms a crucial part of any individual's life and occurs in formal ways such as that obtained in school-type of settings, as well as in informal ways, like at the hand of friends, families, observations and life experience.

In Islamic scriptures, a common quote echoed that had been stated by the Prophet Muhammed (Peace be upon Him) is as follows:

“Seek knowledge from the cradle to the grave.” (*TWF*, 2009)

The above quote highlights the magnitude attached to learning and education in each individual's life and within the viewpoint of society.

Entering a university setting for the purposes of obtaining tertiary education has been stated as being wonderful for some individuals and a tribulation for others (Wittenberg, 2001). The vast literature on higher education provides testament to

the interest in this phase of life and all the inherent elements related to learning. The higher education setting and related matters sparked similar interest and led to the undertaking of the present research. The setting for the study was UWC and the focus was first year students enrolled within the Health Sciences professions in the FCHS.

### **1.3. Historical background of UWC**

Due to the fact that the research study was conducted at UWC, it is important for the history of the university, which includes the reasons for its establishment and the impact on the students of this university, to be described. The following information on the history of UWC was sourced from a 2008 document by the UWC Office of Development and Public Affairs (ODPA). UWC was established in 1960, due to a need created by the Apartheid era (pre-1994). The effect of Apartheid on tertiary educational systems in South Africa was that non-White individuals, termed Blacks or Africans, as well as Coloureds and Indians, were excluded from studying at any university of their choosing. In most cases they studied at UWC. With special permission certain non-Whites were allowed to pursue their studies at the University of Witwatersrand and at the University of Cape Town.

UWC had an open admissions policy meaning that all individuals, regardless of race, were able to apply for access. The establishment of UWC for non-White individuals and the clear racial divide during that time whereby White individuals were depicted as being superior; led to the accompanying perception that UWC students were of a low intellectual capacity. During the 1970's and 80's, UWC started developing ideologies for the institution, such as researching within neglected areas. Academic and political goals were intensified over this period, aided by Archbishop Desmond Tutu who became the UWC Chancellor since 1987. Over the years, UWC has maintained its position as a tertiary education institution that continues to open its doors to underprivileged students by keeping tuition fees low related to the country's growing socio-economic challenges.

UWC aims to provide education of a high quality and is still the largest producer of Black graduates in South Africa. As much as factors have changed since the abolishment of Apartheid in 1994, many of the effects of the Apartheid era/events still remain as a legacy of that time. This is the reason that UWC students can still be viewed as disadvantaged in many respects, which will be further discussed below.

#### **1.4. First year students at UWC**

The first year university students of UWC were the focus of the present study and the rationale leading to this decision will now be explained. A key concern that has been highlighted within literature is that the first year of university studies at any educational institution can be very challenging for new students. This is evidenced by the prevalence of failure and dropping out of studies that is greater in the first year of the students' academic career (Cukras, 2006). There are many different perspectives and reasons listed for failure and dropping out of studies. Wittenberg (2001) provides a psychoanalytic perspective of what the average new student experiences within him/herself when entering a university setting. She states that all new first year students experience some sense of loss and insecurity on entering the new setting, and this is primarily due to the great amount of change with which they are faced. Ferreira (1995) provides an indication of many extrinsic factors that result in failure and drop-out rates of South African first year university students. One such factor is that there are differences in provision of knowledge (Ferreira, 1995). He states that primary and secondary schools focus on the acquisition of knowledge, whereas tertiary settings require the application of knowledge combined with independent study (Ferreira, 1995). Ferreira (1995) further notes that students from disadvantaged backgrounds experience a wide variety of challenges at university, ranging from difficulties with study methods to emotional problems.

The students referred to above, as from disadvantaged backgrounds, are similar to the populace that is attracted to UWC where the present study has been

conducted. The present research therefore encompassed first year students from the FCHS at UWC.

According to the *Oxford Dictionary* (1990, p.138) the word ‘disadvantage’ can in its simplest form be defined as being in an unfavourable condition. The previous section described the historical background of UWC and reflected some reasons as to why students were still viewed as disadvantaged. The UWC student population in most cases still largely comprises individuals from low socio-economic backgrounds, who therefore opt for studying at UWC due to the fact that UWC attempts to keep the fees for studies low (Barends, 2004; *ODPA*, 2008). Unfortunately, the legacy of Apartheid has still left after-effects that further would term UWC students as disadvantaged (Barends, 2004; *ODPA*, 2008). One of the effects of Apartheid is the socio-economic challenges and financial constraints of the students entering UWC.

One of the factors that impact on the structure for matters of learning at a university setting is academic development. The following section will therefore cover the matter of academic development at UWC.

## **1.5. Academic development**

Academic development within the university setting is responsible for considering teaching and learning matters. These include curriculum design and implementation, staff development in terms of facilitation, teaching skills and assessment matters, as well as the student development and throughput in line with the required profession’s outcomes. The information on the history of academic development at UWC was obtained from Professor Tahir Wood who had been a key individual present during the time when important developments to the academic development structures transpired.

UWC had an Academic Development Centre that comprised a number of staff members who aimed to develop teaching and learning matters at UWC (T. Wood,

personal communication, Nov 10, 2009). Restructuring occurred whereby the Academic Development Centre was disbanded and the staff members, known as the academic development officers, were then individually housed within a faculty. The above-mentioned restructuring was believed to aid academic development initiatives due to officers being within each faculty.

The restructuring had a multitude of negative repercussions that surfaced in the years that follow, such as lack of funding (*Academic Development Centre UWC*, 1997). Some of the negatives were that the progress of initiatives and/or projects was slow, due to the fact that the one academic development officer was responsible for an entire faculty (T. Wood, personal communication, Nov 10, 2009). The academic development officers also expressed a sense of lacking support from fellow officers due to no longer having an Academic Development Centre. This was the reason for scheduled meetings by means of the Academic Development Forum that unfortunately had also lost momentum over the years.

One initiative in line with education trends was the recognition of interdisciplinary interaction amongst students (*Academic Development Centre UWC*, 1997). This concept was embodied in the formation of the Interdisciplinary Core Courses Unit (ICCU) at UWC, which has been renamed in 2009 as the Interdisciplinary Teaching and Learning Unit (ITLU). The ITLU within the FCHS offers lecture modules for undergraduate health sciences students. The students from all the departments within FCHS are joined for lectures and assessments. This method facilitates interdisciplinary interaction amongst the students.

The lecture modules, also known as the core courses, were developed to contain the theoretical content that is fundamental to the foundation knowledge required of all the health sciences students. The theoretical content consists of health policies and principles that are required of all the professions within the Health Sciences.

These modules made it convenient for the investigation within the present research study whereby marks from the two first year modules, Primary Health Care (PHC) and Introduction to Philosophy of Care (IPOC) were statistically analysed in order to determine throughput (as in academic achievement) and the relationship with sensory integrative profiles (which will be discussed in the following section). A further reason for the discussion about academic development matters is that the researcher sought to provide recommendations about teaching and learning matters that would stem from the sensory integrative profiles of the students within the present study.

## **1.6. Sensory integration**

In addition to the investigation of the academic achievement of first year students in the higher education setting of UWC, this research focuses on a sensory integration (SI) perspective. SI is a specialized field within the health discipline of occupational therapy. Although it is beneficial to continue with known domains, hence continuing research on the aspect of first year university students and their academic challenges and experiences, exploring new avenues is the key component of embarking on research; and the SI field is the new avenue brought to the fore within the present study.

Sensory integration (SI) is the process whereby the brain organizes the endless amount of sensory information that an individual receives from the environment (Fisher, Murray & Bundy, 1991). The five senses we usually refer to are sight, smell, hearing, taste and touch (Fisher, et al., 1991). SI further focuses on an additional three 'hidden' senses, namely the vestibular system, which relates to movement sensations and the effect of gravity; proprioception, which is the position of the body; and interoception, which is related to the internal organs that provide an individual with sensory information (Faure & Richardson, 2002). The vestibular system and proprioception are more commonly investigated and referred to than interoception (Lombard, 2007a). The process that the brain coordinates in organizing the sensory information, therefore enables the person to

respond appropriately to incoming sensations and thereby react appropriately to the environment (Fisher, et al., 1991).

The field of SI has developed since the 1960's through the work of Jean Ayers who conceptualized Sensory Integration theory (Ayers, 1979). Since then much research has been done by occupational therapists using SI and related techniques in therapy with clients, largely related to clients with difficulties and disabilities, including preterm infants (Case-Smith, Butcher & Reed, 1998), children with autism or pervasive developmental disorders (PDD) (Ermer & Dunn, 1998; Kientz & Dunn, 1997), children with attention deficit hyperactivity disorder (ADHD) (Dunn & Bennett, 2002) and learning disabilities (Greenspan, 2004; Vargas & Camilli, 1998).

An opportunity was created for SI principles, techniques and tools to be utilised for research with other participants, not necessarily clients in therapy or having any type of disability. The SI tool used within the present research is called the Adolescent and Adult Sensory Profile (AASP) questionnaire, which was developed by Brown and Dunn (2002). The AASP questionnaire enables the formulation of SI profiles of the participants, which in this study were first year students from the FCHS. The AASP questionnaire and SI profiles will be discussed as part of the literature review (Chapter Two).

## **1.7. Occupation of students**

This study focuses on academic achievement during the first year of study. From an occupational therapy perspective, this falls into the domain of productivity. Productivity refers to work and productive activities that relate to more than just the inherent activities connected to one's vocation, but also include educational activities, management of the home and care of others (Neistadt & Crepeau, 1998). Occupational therapy considers individuals' occupation as the engagement in, and performance of, all daily activities, specifically related to three performance areas. Firstly, activities of daily living refer to activities like bathing,

dressing and eating (Neistadt & Crepeau, 1998). Secondly are the work and productive activities. The third performance area is that of play and leisure that relates to the exploration and engagement in activities related to leisure and enjoyment (Neistadt & Crepeau, 1998). These constructs related to occupation will be discussed further in Chapter Two. An important acknowledgement is that the field of occupational science has moved well beyond the above description of occupation; however the above description is a fair introduction to this concept for the purposes of the present study, in an attempt to portray that occupation has multiple facets attributed to it.

In relation to the current research and keeping the above viewpoint of occupation in mind, in the case of students, their occupation would relate to more than just their studying activities. The occupation of students would include all the other areas of their lives that impact on their overall occupational performance while at university. The AASP questionnaire utilised within the present study to obtain the SI profiles of students, features questions that represent practical and diverse daily experiences of individuals' lives. The obtained SI profile of the students would therefore provide a holistic view of their lives that in essence relates to the comprehensive view of the students' occupations.

Despite the above discussion of the different facets that are viewed when considering one's occupation, the data that was obtained from the university students as participants of this study accounted for their everyday experiences that impacted on their occupational performance. The focal point of the students' occupation was however the academic achievement that was determined by means of the academic marks they received. The AASP data as well as the academic marks were utilised for analyses, and will be discussed below and in Chapter Three.



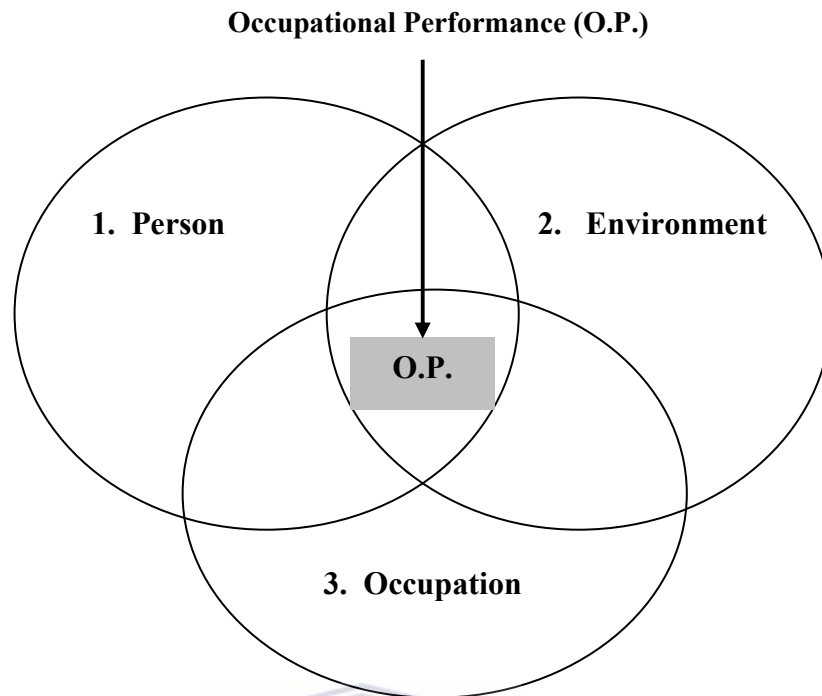
## **1.8. Framework**

Frameworks or theoretical frameworks allow phenomena to be viewed in accordance with where importance needs to be placed according to the issue that needs to be addressed, and thereafter to view how best to address that particular issue (Duncan, 2009). The following section will discuss the model that will be the framework employed in Chapter Two.

The effect of the environment on the behaviour of humans has been recognised by many disciplines, such as psychology, anthropology, social science, architecture, and occupational therapy (Letts, Rigby & Stewart, 2003). Within occupational therapy, paradigm developments led to the recognition that the individual, the environment and the occupation have an association with one another that determines occupational performance (Letts, et al., 2003). In recognising the occupational therapy paradigm developments, the Person-Environment-Occupation (PEO) model (Law, Cooper, Strong, Stewart, Rigby & Letts, 1996) has been utilised as the model providing a framework for the present research.

The PEO model refers to a transaction between three dimensions, namely of the person, his/her related occupations and the environment (Law, et al., 1996).

Occupational performance is the result of the transaction between the three dimensions and when there is congruence between the dimensions occupational performance is enhanced (Law, et al., 1996). When there is a lack of congruence the occupational performance will be reduced.



**Figure 1.1. Person-Environment-Occupation (PEO) Model**

(Source: Law, Cooper, Strong, Stewart, Rigby, & Letts, 1996)

In the present study, gaining a better understanding of the students' SI profiles provides an understanding of the first dimension within the PEO model, the person. Apart from the "person" perspective of the research findings, recommendations have been considered in accordance with the remaining dimensions of the PEO model. The second dimension is the "environment" perspective and in the context of the present study the environment relates to the university setting, such as the teaching and learning structures, student support centres and the lecturers. The third dimension is the "occupation" perspective and in the context of this study referred to the learning content.

### **1.9. Researcher motivation**

The researcher is a qualified occupational therapist who worked as a lecturer at UWC for four years. The lecturing role involved teaching junior and senior level undergraduate students within the FCHS. The researcher then worked for three years within the Academic Development Office at UWC where matters related to

teaching, learning, curriculum and students were handled. The knowledge gained and interest in students and higher education matters, combined with the researcher's background of occupational therapy and SI, culminated in her embarking on the present research. The researcher observed the challenges faced by new first year students and wondered if there was a link between their SI profiles and academic achievement.

The aim of the study was to determine the sensory integrative (SI) profiles of students, and determine whether there was a relationship between the SI profiles and academic achievement of first year students from the FCHS at the UWC.

The researcher attempted with the design of this research study, which incorporated the AASP questionnaire, to illuminate the contribution SI could make to knowledge about higher education and students. Ideally the utopic desire is for the research findings to be considered by academics and educationalists because it is about university students and matters of teaching and learning. Furthermore, since the research incorporated a SI tool and related principles, occupational therapists would be interested in this study and, similar to the academics, would be made aware of factors within higher education and the role occupational therapy could play in such settings. The purpose of the study was therefore to expose students to a SI tool and to gain this particular profile of the students in relation to their sensory responses. SI profiles had not previously been investigated with a university student sample and this research therefore would be addressing the gap in literature. SI profiles and whether there is a relationship with academic achievement of students had therefore also never been explored in research. These reasons deemed the present study worthy of investigation.

## **1.10. Overview of the thesis**

Apart from the introductory chapter, this thesis encompasses a further five chapters that have been constructed as follows.

Chapter Two presents the literature review. Pertinent topics related to the field of research are discussed. The two large sectors of literature that will be presented are about Education and Health. The Education literature will feature information about students, higher education settings and factors related to teaching and learning. The second sector will be about Health disciplines, primarily occupational therapy, SI, psychology and some viewpoints of the multidisciplinary health professions education.

Chapter Three presents the research design and methodology. This chapter will discuss all technical matters related to the research design that framed the study. The two broad sections within this chapter, namely the research design section and the methodology section, will consistently provide theoretical information followed by a discussion thereof, culminating in the specific design and methodology selected for the study. Sections that form a part of this chapter are the research paradigms, approaches, aims, objectives, the study population and setting, as well as all information related to the methods and instruments used. Specific information about the procedures followed in collecting the data and the subsequent analyses thereof will also form a part of this chapter.

Chapter Four presents the results of the study. The two broad sections within this chapter relate to the descriptive analyses and results and thereafter, the second section relates to the inferential statistical analyses and results. The descriptive results section will depict the demographic information of the study's sample followed by the SI profiles and academic achievement data and results. Tables and figures are included to illustrate the obtained results. The inferential results section will depict the various statistical analyses implemented when testing for associations amongst the variables of the socio-demographics, SI profiles, and academic marks. All of the information will lead to the discussion as related to

the research aim of determining a relationship between the SI profiles and academic achievement.

Chapter Five offers the discussion of the obtained research results and is structured according to the socio-demographics, academic achievement, the SI profiles, and the limitations of the study.

Chapter Six presents the recommendations and conclusion of the study.



# **CHAPTER TWO**

## **LITERATURE REVIEW**

### **2.1. Introduction**

The primary framework underpinning this study is the Person-Environment-Occupation (PEO) model (Law, Cooper, Strong, Stewart, Rigby & Letts, 1996). This framework has been utilised to present pertinent literature for this research study. The three constructs are the “person”, “environment” and “occupation” and literature from the two disciplines of health and education will be discussed according to each of the above-mentioned constructs.

### **2.2. Person**

In the context of the present study, the “person” refers to the first year student from the Faculty of Community and Health Sciences (FCHS) at the University of the Western Cape (UWC). The primary focus for investigation within the present research with first year students is in line with sensory integration principles and techniques. However, matters of higher education and learning form another central theme within the present study and are discussed first below.

#### **2.2.1. Students entering university**

Individuals are drawn to learning institutions to acquire knowledge (Wittenberg, 2001). Moreover, these individuals enter the university setting to obtain the qualifications required for a chosen profession (Wittenberg, 2001). Despite these ambitions, new students experience many difficulties and in many cases if they cannot manage it, this results in failure and even dropping out of studies (Wittenberg, 2001).

There are many reasons for failure and dropping out of university. Wittenberg (2001) provides a psychoanalytic perspective of what the average new student experiences intrinsically or within themselves when entering a university setting. She states that all new first year students experience some sense of loss and

insecurity on entering the new setting, and this is primarily due to the great amount of change that they are faced with. She further indicates that even the more secure amongst new students still experience these feelings on entering the university. For the other less secure students, these feelings may be overall too overwhelming, thereby resulting in them dropping out of their studies (Wittenberg, 2001).

Ferreira (1995) provides an indication of many extrinsic factors that result in failure and drop-out rates of first year university students. One factor is a different focus of the provision of knowledge within the secondary education setting compared with the tertiary education setting (Ferreira, 1995). He states that primary and secondary schools focus on the acquisition of knowledge whereas tertiary settings require the application of knowledge combined with independent study (Ferreira, 1995).

Ferreira (1995) further notes that students from disadvantaged backgrounds experience a wide variety of challenges at university, ranging from difficulties with study methods to emotional problems. Barends (2004) reported similar descriptions of the challenges of students from UWC, who are in most cases from disadvantaged backgrounds. It is evident that in any research study conducted about students that their backgrounds in terms of socio-demographic factors, need to be taken into account.

### **2.2.2. Student failure and drop out**

Recent literature had indicated that student failure and dropping out of studies is a serious concern for institutions and countries as a whole (Pillay, 2005). Definite indications are that student failure and drop out is higher within the first year of students entering university studies (Eiselen & Geysler, 2003). Ferreira (1995) noted in his research at a South African university that some factors contributing to students' drop out from studies related to past learning encounters and the students' inability to apply knowledge at the university setting. Ochse (2003) who conducted research at another South African university echoes the above

factors leading to student drop-out and stated that unfortunately the poor student knowledge and academic backgrounds were difficult and more so fairly impossible to remedy once the student had entered the university setting. Ochse's (2003) focus of research was however, on psychological theories and aspects of students that could offer direction and aid intervention for students. Yorke (1999), in research done in Britain, reported that there are three main causes of withdrawal from studies as in: (1) a mismatch with the study choice, (2) financial difficulties, and (3) a poor experience of being a student at university, relating to the teaching and support that the student received. A workshop conducted by the UWC Centre for Student Support Services generated data from the experiences of the staff who primarily worked in the UWC residences and other support structures at UWC. The data acknowledged the above circumstances that were similarly reported by Yorke (1999), that the students at UWC experienced financial difficulties and required support on all levels when entering the university (Schreiber & Jansen, 2008).

In American literature, Peterson and Taylor (2009) who discuss the concept of 'whole schooling', which will be discussed later in this chapter, stated that the prevalence of drop-out rates increases within systems that do not take heed of the individual needs and personal development of its students. This statement provides encouragement for an institution like UWC to consider ways of being able to cater for the individual needs related to the educational development of students. One way could be by considering the impact of, and assistance that could be gained, by means of SI profiles.

Huysamen (1999a) who has been researching within South African university settings has primarily focussed on matters of first year students' performance, and in later research papers looked at the impact of demographic factors and academic factors like admissions testing as predictors of success (Huysamen, 1999b, 2000, 2001). Apart from emphasizing the above-mentioned difficulties that other researchers indicated about students' experiences, Huysamen solidifies the sentiments that demographic backgrounds, academic factors, financial aspects,



students' living conditions while pursuing university studies and the support they receive especially during their first year of studies, need to be considered when investigating any performance matters related to students. Socio-demographic factors and academic backgrounds have therefore been strategically examined in the present study with UWC first year students.

### **2.2.3. Age, stage and identity of first year students**

Students entering university directly after their secondary schooling would be within the adolescent age group. The adolescent age range is difficult to identify with precision but it has been documented as starting from the age of 11 to 13 years and ending between the ages of 17 to 21 years (Kosslyn & Rosenberg, 2006; Louw, Van Ede & Louw, 2005). The theorist, Erikson (1963) divided the human life span into eight stages of psychosocial development. The fifth stage overlaps with the adolescent phase and is delineated by the individuals' search for their identity (Erikson, 1963). The search for identity can manifest in observable ways whereby adolescents seem to go through phases of imitating one another and experimentation (Erikson, 1963).



#### **2.2.3.1. Development of occupational identity**

As discussed in Chapter One, when utilising the occupational therapy view of an individual's occupation, it would relate to a holistic view encompassing three performance areas of an individual (Neistadt & Crepeau, 1998). The performance areas are the activities of daily living, work and productive activities and lastly play and leisure (Neistadt & Crepeau, 1998). The above holistic viewpoint of occupation would in the case of students' occupation relate to more than just their studying activities, but to all the other aspects of their lives that impact on their overall occupational performance while at university. The Adolescent and Adult Sensory Profile (AASP) questionnaire utilised within the present study features questions about an individual's daily life experiences with practical examples like the question "I trip or bump into things" related to the aspect of sensation, of movement processing. Other examples of questions are "I don't notice when people come into the room" related to visual processing, and "I touch others when

I'm talking" related to touch processing. By the AASP questionnaire utilising questions and viewpoints about diverse daily life experiences, the final interpretation of the AASP questionnaire serves to provide a holistic or comprehensive view of the person. This can then be translated as a good indication of the person's occupation - the first year student being the person referred to within the present study. Besides the utilisation of the AASP questionnaire to yield the SI profile, the students' occupation as it relates to learning matters and academic achievement (through marks) is investigated.

Furthermore, due to an occupational science focus within the field of occupational therapy, the perspective of the occupation of individuals has shifted from thinking about occupation and identity as separate entities. The notion of "occupational identity" emerged as a particular dimension of identity (Rudman & Dennhardt, 2008). The acquisition of the SI profile in line with their occupation of being a first year student, would therefore serve to provide an indication of their occupational identity, which can then be seen as beneficial to them in line with Erikson's account of adolescents being in search of their identity (1963) within this age and stage of development.

#### **2.2.3.2. Benefits of awareness of occupational identity**

The benefits of being introduced to their SI profiles and indications of their occupational behaviour could transcend what has been discussed above in relation to Erikson's (1963) stage of identity search. Wilson and Wilcock (2005) conducted a study with first year students from Brunel University in the United Kingdom. They found that when the theoretical concept of "occupational balance" was introduced to the students early in their studying career, this aided in expanding their knowledge and awareness on a personal and professional level. Occupational balance can be seen as a representation of an individual's engagement in approximately equal amounts of time on productive, leisure and self-care activities (Molineux, 2004).

In terms of the professional development of an occupational therapy student into an occupational therapist, certain concepts of health and well-being are often overlooked, yet it is imperative within the knowledge base and understanding of such a health professional (Wilson & Wilcock, 2005). The knowledge and reflection of one's life in relation to occupational balance therefore needed to be introduced to occupational therapy students early in their studying career, which was done in Wilson and Wilcock's study (2005). The findings of Wilson and Wilcock's (2005) study indicated that the participants' gained awareness of occupational balance and the relation to health and wellbeing. Furthermore, as the researchers anticipated, the participants displayed changes within their life choices that depicted the seeds to ultimate health benefits for themselves.

### **2.2.3.3. The Y generation**

There are no precise time ranges for when the Y generation starts and ends, however Maūrtin-Cairncross (2008) lists the Y generation as individuals who were born between the years of approximately 1977 and 1997. The Y generation is also known as the Millennial Generation or the Net Generation (Maūrtin-Cairncross, 2008).

In relation to students learning at university Maūrtin-Cairncross (2008) documents that the Y generation students tended to enjoy finding information by means of technology sources like the internet, yet these individuals portrayed the lack of critical thinking skills that displayed their tendency to think in "chunks". Maūrtin-Cairncross (2008) related this poorly developed skill to decisions that these students would make without having the full knowledge of what they were doing and the inherent consequences. Incidences of students utilising the internet information that they sourced for assignments and academic tasks would then reveal plagiarising, as issues of ethics may not have reached their realisation, possibly due to their comfort of having large volumes of data at their fingertips due to the internet.

The students within the present research are from the Y generation, therefore deeming this information essential to mention. The preceding sections within this literature review refer to the first year student's identity and the Y generation would undoubtedly need to be considered. The results of the present research on the SI profile tendencies and learning would therefore be considered in relation to the tendencies expressed within the Y generation literature.

In summary, the above discussion within this section was about the first year student, occupation, occupational identity, SI profiles and the importance of certain concepts being introduced early on in an individual's study career. These matters have been included to illustrate the value that the awareness and knowledge of SI profiles and preferences could have on the first year student. The main benefit of the student gaining a SI profile would be to contribute to developing identity.

#### **2.2.4. Learning at a higher education institution**

The construct of the "person" is the first year university student. It is important to understand the different forces that impact on the student. Matters of learning will be discussed below, due to the fact that learning is the important "occupation" of the student's life. Literature on learning will be discussed in more detail when the construct of "occupation" will be discussed later in this chapter.

##### **2.2.4.1. Learning theory**

Learning can be defined as the achievement of knowledge through experience (Case-Smith, 2001). Learning has also been described as the acquiring and modification of knowledge, skills, attitudes and behaviours (Schunk, 2008). In order to understand the concept of learning, it is important to consider developmental theories (Case-Smith, 2001). Development and theories of development supply checkpoints of the stages in individuals as they mature into functioning adults (Case-Smith, 2001). There are many theorists who have contributed to our knowledge of learning. Skinner (1976) provided one of the earliest and perhaps the best-known learning theory when he dictated that the

environment shaped the behavioural response of individuals. Piaget (1952) similarly discussed learning at the hand of the environment, but he was more of the idea that children were intrinsically motivated to learn from their environment and not merely responding to the environment. Piaget (1952) provided the concept of cognitive development whereby he explained about a child's ability to adapt to experiences within their environment (Case-Smith, 2001; Louw, et al., 2005). Piaget (1952) further discussed the cognitive processes employed in adapting to those environmental experiences, followed by assimilation and accommodation of the information, thereby organizing the information by the brain facilitating the learning process (Case-Smith, 2001; Louw, et al., 2005). There are many other influential theorists, but Vygotsky (1962) presented the concept of a zone of proximal development, which he discussed as:

“The distance between the actual developmental level as determined by independent problem-solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers” (Vygotsky, 1962, p.86).

Vygotsky (1962) explained that when an adult and child experienced learning opportunities together, the two would interpret the scenario very differently. He stated that the adult would be able to use language to aid the child in developing a concept of the learning situation. He also stated that when there is an opportunity for the child to utilise their existing skills and the task provides a fair challenge, then the adult can aid the progress of the child by behaviour and language aids. Vygotsky's (1962) belief of children's learning at the hand of the environment surrounding them, the methods of instruction given and their inherent culture were the foundation to many of the dynamic systems models that have influenced learning theory. Vygotsky's (1962) views support the present research study due to the fact that the researcher's view of the changes to aspects within the university setting within the environment could yield support and optimise learning opportunities for the first year students.

Further developments on the topic of learning can be seen in brain-based learning literature that pronounces that there are many factors and influencers that have an impact on learning and the stages of learning (Jensen, 2000). The seven

influencers that are listed are genes, nutrition, peers, brain dysfunction, prior learning, experience, temperament and character (Jensen, 2000). Some of these influencers form part of the AASP questionnaire, which therefore can be seen as the impact of SI profiles on learning, and thereby academic achievement. More information will be discussed under the SI profile information to follow.

The brain-based learning and other literature sources within different disciplines provide reference to the fact that when the internal states of an individual and the outer states surrounding the individual are in a type of harmony, then the learning process can be promoted (Case-Smith, 2001; Jensen, 2000). The occupational therapy and sensory integration literature sources echo the above-mentioned psychological developmental theories as an essential foundation of the professional field of enquiry. All of the above literature viewpoints offer the rationale as to the researcher's motivation for bringing about an awareness of the SI profiles of the students and the adaptations that could be made to the learning environment to facilitate learning. The outcomes could be as far reaching and optimistic as alleviating the stress and learning challenges for students and then possibly aiding to reduce drop out rates of students from their studies.

Although academic achievement was measured as the inclusion of academic marks within the present study, the theoretical underpinnings of learning are acknowledged as forming the imbedded part of the variable of academic achievement. The concept of learning will be further discussed by means of literature on learning styles.

#### **2.2.4.2. Learning styles**

Transcending beyond learning theory and development, the concept of learning styles also arose. Learning styles can be defined as the tendency to adopt a particular strategy in learning (Fatt & Joo, 2001). Van Rensburg (2009) defined learning styles as the manner in which an individual perceives information and experiences and gains meaning from it.

The literature on approaches to learning, learning styles and studying inventories is vast and complex, as can be seen by the previous section on learning matters. Coffield, Moseley, Hall & Ecclestone (2004) in their systematic review of the learning styles and pedagogy literature, provide the following evidence of the substantial research studies on these learning topics. David Kolb, who will be discussed in more detail below, embarked on a project in the year 2000, whereby he and his wife compiled a bibliography of research related to the theories he had developed. He was able to deliver 1004 such entries (Coffield, et al., 2004). A second testament to the fact of the vast research into learning styles is the website of Dunn and Dunn's Learning Styles Questionnaire that has a bibliography of 1140 listings (Coffield, et al., 2004). Katherine Cook Briggs and her daughter Isabelle Briggs Myers developed the Myers-Briggs Type Indicator and there are reportedly 2000 articles on this topic that were documented between 1985 and 1995 (Coffield, et al., 2004). Due to the extensive literature base on learning styles, it was deemed worthy to be documented here, as learning styles do link to academic achievement, which is the focus within the present study.

One of the most influential theorists on learning styles is David Kolb. Kolb (1984) introduced his model of learning styles in 1984 after developing it for many years, and his model of learning styles gave rise to the Experiential Learning Theory (ELT). Kolb acknowledged his indebtedness of ELT to Jung's theory of psychological types (1977). The theoretical information furthermore led to Kolb's Learning Styles Inventory questionnaire that categorised individuals as one of the four learning styles, which are Divergers, Convergengers, Accommodators and Assimilators (Kolb, 1984). These four learning styles refer to the individual's tendencies to think about and absorb acquired information (Kolb, 1984). The four learning styles in relation to Jung's psychological types (1977) can be described as follows. In simplifying the description of the divergent learning style, this learning style can be seen as relating to an introverted personality type (Kolb, 1984). The convergent learning style can be seen as quite the opposite of the diverger learning style, as convergers have a relation to an extroverted personality type (Kolb, 1984). The accommodating learning style related to individuals who

had a sensing type of personality which means the emphasis is the perception of facts, details and concrete events (Kolb, 1984). The assimilative learning style related to the introverted intuitive type of personality which means that the emphasis is on possibilities, imagination and seeing things as a whole (Kolb, 1984).

Many researchers such as Myers-Briggs (1962) and Hudson (1966) to name but a few have extended the work on learning styles and their relation to factors like personality profile and career choices (as cited in Bayne, 1997). Honey and Mumford (1986) however extended Kolb's (1984) theory into a psychological framework of four basic learning styles known as activist, reflector, theorist and pragmatist (as cited in Honey & Mumford, 2000). In one of the latest research studies in the South African context, Van Rensburg (2009) conducted a qualitative research study where she reviewed learning styles inventories in an attempt to develop a self-assessment learning-style assessment known as the Learning Style Assessment Tool (LSAT). The LSAT utilised Kolb's (1984) model of experiential learning as its basis (Van Rensburg, 2009).

Many of the learning styles have some correlation to the individuals' senses and interaction with the environment. Van Rensburg (2009, p.182) recognised this in her statement that learning styles encompass "sensory partiality, perceptual preferences" and factors within the environment that are most conducive to promoting learning.

The discipline of occupational therapy and knowledge about learning is grounded in the early psychological theories and in some ways led to the development of intervention techniques and strategies within occupational therapy, as with the specialised field of sensory integration. The present study incorporates the acquisition of the students' SI profiles that would provide an indication of how they utilise their senses and in this way obtain learning at the university setting. As mentioned earlier, learning theories and the concept of learning styles have a link to academic achievement, which is one of the focus areas of the present



study. It is however important to note that learning styles were beyond the focus and scope of the present study and were therefore not investigated. Listing this literature was however important to display the concept of learning styles and the strong interest into learning styles and related factors in students.

Another important movement within the literature field of learning is the belief of brain dominance, where there is the notion of one of the two hemispheres of the brain taking precedence over the other (Coffield, et al., 2004). Ornstein (1977) attributed different forms of consciousness to two sides of the brain, namely the left and right brain. The left hemisphere of the brain has been described as being involved with analytical and logical thinking as well as words and language (Fatt & Joo, 2001; Ornstein, 1977). The right hemisphere of the brain has been linked to more artistic characteristics like visualising, intuition, creativity and imagination (Fatt & Joo, 2001; Ornstein, 1977). Robert Ornstein, who is a psychologist and neurobiologist, went on to discuss in his book entitled *Multimind, a new way of looking at human behaviour* (Ornstein, 1986) that different control centres within the brain provided separate mental abilities and each individual had their own combination of them. These linked to the understanding of multiple intelligences and due to the researchers that followed this theme, it can be seen that Ornstein was not alone in his viewpoints.

Ned Herrmann developed the 'whole brain' concept and thereafter the Herrmann Brain Dominance Instrument (HBDI) (Jensen, 2000). Herrmann's literature was expressed in connecting to thinking styles (Hermann, 1989, as cited in Jensen, 2000). The whole brain concept related to thinking and learning was in line with the belief that learning is too complex a process to be considered or related to just one cerebral hemisphere of the brain (Jensen, 2000). These notions resonate with the brain-based learning movement that adhere to the fact that most of the brain is involved in absolutely every act of learning (Jensen, 2000).

All of the above literature and movements within the literature sources of learning aim to demonstrate that the concept of learning has long been of interest to

theorists and researchers. Although learning styles and thinking styles had not formed a part of the present research with first year university students, the fact that academic achievement was a central theme within the present study meant that an understanding of learning needed to also be gained.

#### **2.2.4.3. Other learning concepts and intelligences**

A recent South African study explored the relationship between thinking styles and emotional intelligence (Murphy & Janeke, 2009). Emotional intelligence can be defined as the ability, capacity and skill to manage one's emotions (Murphy & Janeke, 2009). The various emotion-related skills utilised by individuals have been grouped together and called emotional intelligence (Mayer & Salovey, 1997; Salovey & Mayer, 1990; as cited in Aronson, 2002). Although emotional intelligence is receiving much more attention in recent times, early roots of this concept can be traced back to Darwin's work in the 1900's, where he acknowledged that emotional expression was important for survival and adaptation (*Wikipedia*, 2009).

Murphy and Janeke (2009) conducted a study among postgraduate university students using the emotional intelligence questionnaire. They found evidence of thinking styles accounting for academic performance, and correlations between the thinking styles and emotional intelligence. There are similarities in some of the features of the questionnaire in relation to the AASP questionnaire utilised within the present study. These similarities are that the questionnaires in both cases were self-reporting inventories and the items within the questionnaires provide descriptions about everyday life.

Another South African study looked at similar constructs whereby thinking style preferences, emotional intelligence and leadership effectiveness were explored (Herbst & Maree, 2008). The research article explicated that learning and thinking can not be pinpointed to simply the left or right hemisphere of the brain, as this would be too simplistic a deduction (Herbst & Maree, 2008). A key reasoning could be seen in terms of the physiological mechanisms of the human

body that depict that all brain activities occur in an integrated manner (Herbst & Maree, 2008). The integrated brain manner described connects to Herrmann's whole brain literature, listed above (Hermann, 1989, as cited in Jensen, 2000).

The researcher wishes to bring to the fore the concept of "sensory intelligence" (Lombard, 2007a), that denotes the awareness of one's sensory preferences. Sensory intelligence will be discussed in more detail in the sensory integration sections to follow.

Literature on learning and factors affecting learning similarly display a link between socio-demographic factors and learning, which forms part of academic achievement (Jensen, 2000).

#### **2.2.5. Academic success of students**

The first year university student experience has become a significant area of interest and investigation, due to the student's challenges, risk factors, drop out rates and academic performance. The interest in the first year university student is evidenced by the literature sources as well as conferences centred on this theme. An example of this can be seen in the Western Cape where the first conference on the topic of first year students, entitled the "First Year Experience" was hosted by the University of Stellenbosch in 2008.

Academic achievement in most cases refers to success achieved within academic studies. In research literature when academic achievement has been measured, the words throughput and attrition have also been used. Within the context of the present study, matriculation marks and first year academic marks were obtained to represent the academic achievement variable, to be utilised in analysis correlations.

There has been much speculation as to whether academic marks are good predictors of entry into university studies as well as future academic success within the students' university careers. Huysamen (2000) found within his research with South African students, that the first year university marks were

better predictors of future academic success for the ongoing years of academic studies than matriculation marks. Within the present study, the researcher employed both the matriculation marks and university marks, not necessarily as predictors for future success within the students' studies, as this was not the research aim, but rather to investigate whether there was a link between the SI profiles and academic marks of the students.

According to Lourens and Smit (2003) however, matriculation marks also referred to as grade 12 marks, still play an important role in students' entry into first year university studies.

There are many factors that relate to success at university. According to the integration-commitment model of attrition designed by Tinto (1975) and later adapted by Pascarella and Terenzini (1980), there are certain reasons related to students' continuation with their university studies. Persistence in studies was strongly attributed to the level of academic and social integration with the university institution, the student's commitment to achieving their degree qualification and the commitment of the student to the institution selected for his/her studies (Lourens & Smit, 2003). These factors were found in Wittenberg's (2001) psycho-analytical perspective of what a first year university student experienced intrinsically when entering the studying environment. Other intrinsic factors that relate to academic achievement have been found to relate to concepts within the field of positive psychology, like resilience and fortitude. More information about positive psychology will be discussed further within this chapter.

Another important factor to be considered in the discussion about academic achievement is that Huysamen (2000, p.147) discussed the concept of "late blooming" that refers to the fact that previously disadvantaged students were able to bridge the gap in terms of their academic challenges or under-preparedness for university life, but this occurred in the latter academic studying years. It is important to note however, that the late blooming only occurred when adequate

support was provided to the students. The under-preparedness of students will be discussed in more detail in the section below.

Other factors that relate to academic performance can be seen within the interest in the self and self-concept in recent literature, which relates to the earlier discussions about the search for identity of the adolescent stage of development (generally the age group of first year university students). Self-concept which in general terms is the perceptions of self-worth and self-esteem of individuals has a link to their academic performance (Aronson, 2002). The knowledge of the students' SI profile would add to their understanding of their self-concept and therein have merit related to their academic achievement.

#### **2.2.6. Under-preparedness of students**

Studies conducted in the developed world have outlined that the newer first year students are different as compared to previous generations. Many of the descriptions are similar to the South African students, however certain factors like the use of technology from a young age is what has impacted on the differing student profile in the literature from the developed countries. What has also become abundantly clear is that the South African first year student entering the university setting, has been termed "under-prepared" (Miller, Bradbury & Acutt, 2001). Since preparedness can be defined as being ready, then the term under-preparedness can be defined as the individual not being ready for university life and studies (*Oxford Dictionary*, 1990, p.395).

Literature indicates reasons for under-preparedness of students due to the high school system, and the Outcomes Based Education (OBE) system within schools that has reportedly resulted in a number of negative outcomes, as described by Huysamen (2000). The education received by learners during their high school careers undoubtedly has an impact on their preparedness for university study (Ferreira, 1995; Matoti & Lekhu, 2008). Cukras (2006, p.194) found that the only way for under-prepared students to become academically successful would be for them to become "self-regulated learners". Self-regulated learners are individuals

who enact behaviours that display their motivation and metacognitive mechanisms to make a success of their learning, and monitor themselves (Cukras, 2006).

Cukras (2006) explained that for under-prepared individuals to become successful self-regulated learners, they would need to gain the required reading and study skills by means of academic assistance programmes provided by the university. The implementation of academic assistance programmes has been recommended by South African researchers (Barends, 2004; Ferreira, 1995). The programmes aid the students to understand their assigned tasks at university followed by having the knowledge to implement the appropriate strategies for reading, understanding and studying the assigned university content (Cukras, 2006). She found that the participants within her study implemented the gained study strategies obtained from the exposure to the academic assistance programmes when they prepared for their university tests (Cukras, 2006). Furthermore, she found that the collaborative work the participants implemented within group study aided the second-language students who benefited from their more skilled peers (Cukras, 2006). This method of collaborative work where learning is scaffolded relates to Vygotsky's (1978) principles, discussed earlier.

Knowledge and understanding goes hand in hand with self-monitoring. Self-monitoring is important for first year university students in gaining a sense of themselves, as a key pursuit of adolescents, as stipulated by Erikson (1963). The gained SI profile of first year students would entail a gained understanding of self and could then link to better monitoring of the study activities within their university studies, which then could be seen as a link to becoming better self-regulated learners.

#### **2.2.7. Factors affecting students**

There are many factors affecting individuals on a daily basis. In terms of simply looking at one's body, one's brain and senses are working all the time. An

individual's eyes open in the morning and allow information and learning for the duration of the day.

In referring to the university student now, there are many factors affecting them in their quest for learning.

Alexander (2004) discusses diversity matters within the educational context that have an impact on students. Some of these factors have previously been mentioned in the section related to the under-preparedness of students for university studies. Diversity within the university context may be defined as the inclusion of individuals of different gender, race, ethnicity, sexual orientation, and physical ability (Alexander, 2004). When universities boast about diversity, then in most cases they are stating that access has been allowed for students from under-represented races and ethnicities (Alexander, 2004).

The exact success factors and the factors relating to under-preparedness of students, that have been discussed in the previous sections can be attributed to the multitude of factors affecting university students within their lives and within their studies. Depending on the balance of these factors, it can represent or provide an indication as to whether these factors would link to positive or success outcomes for the student or the negative outcome of dropping out from studies or challenges within their university studies. To summarise the previously discussed factors, the internal factors affecting the student can be seen as the reasons for them entering the university setting and in relation to that, the internal pressures and pressure as stress experienced from others, like their parents. Other internal as well as somewhat external factors can be seen as linking to race and ethnicity matters, namely the home language of the students in relation to the language of instruction within the university situation. The living arrangements and financial aspects related to studies similarly have an impact on the student. Other factors at hand could relate to matters of the past as could be seen with the discussions about the establishment of UWC and the past matters of Apartheid having an

impact on the perception of the institution and the individuals associated with the university.

#### **2.2.7.1. Positive psychology**

Positive psychology refers to the movement within the discipline of psychology that focuses on strengths as opposed to the traditional deficit model of viewing limitations within individuals. Literature sources forming a part of positive psychology can be observed by research on resilience that attempts to uncover and provide reasons for the incidences where some individuals prosper whilst faced with challenging circumstances, whereas others faced with the same challenges do not. Positive psychology researchers such as Rutter (1990) and Garmezy (1985) have attributed positive outcomes to the protective factors that relate to the instance of a child and the environment (Case-Smith, 2001). The above-mentioned field of enquiry offers foundation to the fact that the researcher of the present study feels that the acquisition of the SI profiles of students could aid in a better understanding of the university students and appropriate support within the environment to enhance academic success.



#### **2.2.7.2. The Circle of Courage**

The Circle of Courage is an approach based on traditional Native American child-rearing philosophies (Brendtro, Brokenleg & Bockern, 2002). The philosophies relate to a system of effective positive discipline of youth (Brendtro, et al., 2002). As discussed previously, the emergence of positive psychology displays the support of strengths-based approaches and thereby the revival of the previously held beliefs and philosophies epitomised within a model like the Circle of Courage (Brendtro, et al., 2002). In the field of Education, the Circle of Courage, has been adopted and embraced by the Education system in South Africa, which has rolled out this viewpoint within the primary and secondary schooling systems in the Western Cape (*Western Cape Education Department, 2007*). International literature also lists the concept of “whole schooling” for implementation within their public school systems (Peterson & Taylor, 2009). Whole schooling refers to a system that provides a broader curriculum with a holistic focus encompassing



the needs and interests of the students (Peterson & Taylor, 2009). Whole schooling practices share the principles of the Circle of Courage (Peterson & Taylor, 2009).

The above discussion of literature and changing viewpoints links to the present research study in that it is also taking the stance of viewing the individual's SI profile from a strength perspective. It is important to view the systems in place within the current Education system in the Western Cape so as to build on existing initiatives and also with the possible viewpoint of the systems impacting on tertiary education settings. It would be important to use the existing systems to look at where learners are experiencing challenges and skills that are omitted for developing, not merely in the primary and secondary schooling settings, but the students within tertiary education settings. Van Rensburg (2009) warns about instruments such as learning-style instruments that could to some extent be stereotyping the students and lead to the danger of self-fulfilling prophecies whereby the students feel based on the results that they would be unable to gain anything beyond what the results have implied. A model that has a holistic viewpoint, such as the Circle of Courage, could then prevent such detrimental viewpoints made by the students.

The previous sections discussed factors that affect students and psychological theories and frames of references that have been applied in viewing students. The following section will now discuss the occupational therapy theory and frames of references, sensory integration, that is relevant to the present study.

#### **2.2.8. Sensory Integration**

Sensory Integration (SI) is the process whereby the brain organizes the endless amount of sensory information a person receives from the environment (Ayers, 1979).

Jean Ayers, an occupational therapist, was the first theorist researching and publishing between 1965 and 1987 on her conception of Sensory Integration

theory (Baren, 2006). Ayers described sensory integration theory to be the central nervous system's processing and organization of the flow of sensory impulses resulting in the provision to the individuals' brain of the picture of the world (Ayers, 1979; Mulligan, 1998).

SI focuses on a total of eight senses within individuals (*Baby sense*, 2006; Faure & Richardson, 2002). The five readily referred to senses are sight, smell, hearing, taste and touch (Fisher, Murray, & Bundy, 1991). The additional three senses that are noted as the 'hidden' senses are the vestibular system related to movement sensations and the effect of gravity, proprioception, which is the position of the body, and interoception, which is related to the internal organs that provide an individual with information (Faure & Richardson, 2002).

Parham is another prominent individual researching and expanding on the knowledge of SI since the 1980's. Parham's studies were primarily in children and she was one of the editors of the academic books on occupational therapy in children (Parham & Fazio, 1996 & 2008). Evidence of Parham's influence on the theoretical development of SI could be seen by her study in 1982 where she presented a theoretical model of play to be used within paediatric occupational therapy. In this study, Mack, Lindquist and Parham (1982) investigated two occupational therapy approaches, namely SI and occupational behaviour in line with the model of play. Lindquist, Mack and Parham (1982) presented this second paper on the above-mentioned study and it featured the clinical applications related to the model of play. The preceding paper had provided the theoretical foundations of the proposed model of play. Parham's research over the years has been on the occupational therapy services provided to children with disabilities. Clark, Mailloux, Parham and Primeau (1991) conducted research with a sample of children with learning disabilities, mild to moderate perceptual and motor deficits. Clark, et al. (1991) discussed the issues affecting the occupational therapy services to children with disabilities, one of which was the scope and content of occupational therapy services given to children with disabilities. Similarly, in 2007, Parham was involved in research investigating the

use of intervention strategies in children with sensory integration disorders (Mailloux, May-Benson, Summers, Miller, Brett-Green, Burke, Cohn, Koomar, Parham, Roley, Schaaf, & Schoen, 2007). Parham's efforts continued to be in line with validity and reliability testing of intervention approaches in children, as can be seen in her more recent publications. Parham, Cohn, Spitzer, Koomar, Miller, Burke, Brett-Green, Mailloux, May-Benson, Roley, Schaaf, Schoen and Summers (2007) examined 34 SI intervention studies, noting the factors that pertained to structural categories and therapeutic process categories. The findings of that study revealed that the effectiveness of SI intervention could not be investigated until consistency of the recording of essential elements about the SI intervention was established (Parham, et al., 2007). Parham was involved in the investigation of other measures within SI, such as the Sensory Integration and Praxis Tests (SIPT), where the inter-rater reliability of trained professionals using the SIPT was investigated (Asher, Parham & Knox, 2008). Inter-rater reliability was established however there were contradictions amongst the participants on the specifics of the dysfunction they noted in the patients/clients. The recommendations were made that more clinical information would be required by the raters for more astute distinctions on the patterns of dysfunction within the patients/clients. The recent study by Parham, Roley, May-Benson, Koomar, Brett-Green, Burke, Cohn, Mailloux, Miller and Schaaf (2011) was on the development of a measure to examine the effectiveness of Ayers' SI intervention. This study is in line with the previously mentioned research where Parham, Cohn, et al. (2007) sought to investigate the effectiveness of SI intervention by viewing SI intervention studies and found that a measure was required to establish consistency in recording the elements of the SI intervention. All of the above serve to indicate the dedication to researching within the field of SI displayed by Parham and the contributions thereof.

More information about the senses and the developments within SI will be discussed in the sections to follow.

### **2.2.8.1. Viewpoints of the field of Sensory Integration**

Literature across health disciplines exhibits the importance of observing the senses and sensory responses. This can be seen in clinical research studies where sensory responses are examined in line with the laboratory testing of tissue samples and organs of animals and human beings.

In the field of SI however, as with any other field of inquiry, the various health disciplines have different viewpoints, namely they either accept the constructs or hold scepticism (Vargas & Camilli, 1998). Kluger (2002) refers to a book written by the developmental psychologist, Sharon Heller (2002) on sensory defensive disorder (SD), and highlights the controversies about SI by different professional disciplines. Heller (2002) speaks of SD and discusses peoples' sensitivity to certain sensory experiences and the related behaviours. She indicates that genetics play a role in this condition, which is in line with what occupational therapists have documented (Heller, 2002). Many clinical psychologists state that new disorders are often just a list of symptoms that link to existing conditions and the viewpoints of others are that if Heller and other individuals were highlighting more information about problems, then it would be expanding knowledge (Kluger, 2002). Baren (2000), a paediatrician, echoes this accepting viewpoint, as he pointed out that within his practice he supported using occupational therapy and physical therapy to deal with some of the problems of children with neurodevelopment difficulties. Literature on clinical work in paediatrics indicates the use of both physiotherapists and occupational therapists as part of intervention with various medical pathologies with patients, more commonly referred to as clients (Vargus & Camilli, 1999).

Vargas and Camilli (1999) specifically listed the fields of neuropsychology, education, and medicine, as demonstrating criticism of SI. They deduced that some professionals support and appreciate the value of SI approaches, whereas others consider them to be ineffective (Vargas & Camilli, 1999). They set out to ascertain whether existing studies of intervention at the hand of SI approaches supported the efficacy thereof and conducted a meta-analysis whereby 16 studies

were utilised for comparison with other interventions methods (Vargus & Camilli, 1999). These studies were primarily related to children and related to learning (Vargus & Camilli, 1999). The research found, amongst other things, that SI intervention methods were as effective as various other alternative intervention methods (Vargus & Camilli, 1999).

In concluding about the various viewpoints of SI, it can be seen with the above discussion that there are a combination of differing responses from health professionals. It can however be noted that the interest and acceptance of sensory integration conditions are increasingly growing, as depicted by the advances within the knowledge base over the last 40 years, after the first observations of SD in hyperactive children were made by occupational therapists (Kluger, 2002).

As with Heller's (2000) book, parents and other individuals are sharing information pertaining to their children and SI issues. This can be seen in the books that have emerged since then, such as Emmons and Anderson, who have to date written two books on sensory dysfunction and the challenges that mothers face, and which they proudly proclaim originated from their waiting room discussions when taking their children for intervention (Anderson & Emmons, 1996; Emmons & Anderson, 2005). Their search for knowledge about SI transcended reading literature to gaining various qualifications and continuing their own work experiences as educators (Emmons & Anderson, 2005). The journey of Emmons and Anderson depicts the reality of individuals with SI challenges and the emerging interest in these matters.

Similarly, the section following below about senses, provides an indication that although controversies and differing viewpoints about SI may have surfaced in the past, the concepts central to this field of inquiry have long been accepted in many different fields.

Furthermore, despite what may appear as reliance on other fields of inquiry to acknowledge and somehow validate SI, one should heed the Australian

occupational therapist Marilyn Pattison, who encourages occupational therapists to realize the changing world, and that the destiny of the occupational therapy profession should be created by means of finding different avenues and innovative ways of making a difference in people's lives, their health status and well-being (Pattison, 2007; Pattison, 2008). This clearly advocates for the stance of occupational therapists to bring about new interventions, fields of inquiry and knowledge.

#### **2.2.8.2. Senses**

As discussed earlier, SI focuses on the senses (Fisher, Murray, & Bundy, 1991). More than 2000 years ago, Aristotle described the five traditional senses of sight, hearing, smell, taste and touch (Kosslyn & Rosenberg, 2006). The field of SI within the discipline of occupational therapy, focuses on an additional three senses, namely the vestibular system related to movement sensations and the effect of gravity, proprioception, which is the position of the body, and interoception, which is related to the internal organs that provide an individual with information (Faure & Richardson, 2002). These additional three senses somewhat overlap with the senses now recognised by the field of science and psychology, that are referred to as the somasthetic senses (Kosslyn & Rosenberg, 2006).

The somasthetic senses are defined as senses that relate to perceiving the body and the body's position in space (Kosslyn & Rosenberg, 2006). These somasthetic senses include kinaesthetic sense, vestibular sense, touch, temperature sensitivity, pain sense, and magnetic sense has been listed as a possibility (Kosslyn & Rosenberg, 2006). Researchers have even argued for the recognition of a final sense, the eleventh in total, as being extrasensory perception (ESP) (Kosslyn & Rosenberg, 2006).

In essence, what the above discussion of senses indicates is that the ideas around the senses of an individual have long surpassed Aristotle's announcement of the five traditional senses. Furthermore, as has been discussed in the previous section

about the different viewpoints of sensory integration (SI), the recognition of additional senses within science and psychology should therefore lend itself to the acceptance of the philosophical underpinnings of sensation as is epitomised by the field of SI.

Definitions of the above-mentioned somasthetic senses are as follows. The kinaesthetic sense has receptors in the muscles, sinews and joints of the body (Louw & Edwards, 1997). The receptors transfer information about the movements of the joints within the body and the position of the limbs (Louw & Edwards, 1997). The kinaesthetic sense is therefore very important as it aids in the possibility of movement (Louw & Edwards, 1997).

The vestibular sense relates not only to hearing but also balance (Kosslyn & Rosenberg, 2006). The vestibular sense therefore provides information about how the body is oriented related to the impact of gravity (Kosslyn & Rosenberg, 2006). The sense of touch has been documented as being the most prominent sense of an individual, due to the fact that the individuals' body is made up of the skin which is the largest organ (Kosslyn & Rosenberg, 2006). The skin is made up of receptors that detect the sensory stimulation received and then a series of impulses are sent through the somatosensory cortex, the nervous system, of the body (Kosslyn & Rosenberg, 2006). Weinstein (1968, as cited in Kosslyn & Rosenberg, 2006) listed that women are more sensitive to touch than are men and that women were especially sensitive on their backs and stomachs.

The somewhat controversial senses recognised within psychology are the magnetic sense and extrasensory perception (ESP) (Kosslyn & Rosenberg, 2006). The reason for the controversies is related to the fact that there are still disputes as to whether magnetic sense only applies to birds (Kosslyn & Rosenberg, 2006). It had been found that birds are guided in part by the magnetic field of the earth and thereby are able to migrate long distances utilising this magnetic sense (Gould, 1998; as cited in Kosslyn & Rosenberg, 2006). Other animals have been found to possess this magnetic sense and there is evidence of humans possessing a weak

form of this magnetic sense (Baker, 1980 as cited in Kosslyn & Rosenberg, 2006). However, the phenomenon in human beings has not been sufficiently studied to ascertain that all human beings possess magnetic sense (Kosslyn & Rosenberg, 2006).

Extrasensory perception (ESP) has been defined as the ability to perceive and discern things without the use of the traditional five senses (Kosslyn & Rosenberg, 2006). There are different types of ESP, namely telepathy, which is the ability to transfer thoughts from one person's mind to another person's mind (Kosslyn & Rosenberg, 2006). Other forms of ESP are clairvoyance, which refer to the ability to know about events and/or reading someone else's mind without using the traditional five senses (Kosslyn & Rosenberg, 2006). Clairvoyance is similar to precognition, which is the ability to foretell and predict future events (Kosslyn & Rosenberg, 2006). Lastly, psychokinesis, is a form of extrasensory perception whereby an individual is able to move objects without physically moving the object (Kosslyn & Rosenberg, 2006).

Most researchers and psychologists are sceptical about the ESP senses due to the fact that there is not sufficient evidence of the existence of these phenomena and the failure of replications thereof (Brugger et al., 1990; Honorton, 1997; Watt & Morris, 1995 as cited in Kosslyn & Rosenberg, 2006).

As interesting as the above controversial somasthetic senses may be, the purpose of the discussion of these are merely in acknowledging the literature stores on the recognition of additional senses beyond the traditional five senses. The focus of the eight senses within the field of SI forms part of the design of the present research study, whereby the eight senses form part of the AASP questionnaire utilised as a data gathering measure. This will be discussed in more detail in the section on the AASP questionnaire below as well as in Chapter Three.



Regarding the value of our senses and sensation, Dr. Winnie Dunn, the developer of the AASP questionnaire, affirmed that sensations provide a map of our bodies and of the world (Dunn, 2006).

### **2.2.8.3. Sensory Processing**

*The Oxford dictionary* (1990, p.399) defines the word process as a series of operations used in making or manufacturing something, a procedure. In SI, sensory processing is defined as the ability and process of interpreting the information the brain has received via the senses (Daniels & Dunn, 2000). Sensory processing is similar to the reference of perception within psychology literature, which will be discussed below.

Psychology literature indicates two phases that follow one another in allowing an individual to gain the required information about the world around him/her (Louw & Edwards, 1997). The two phases are sensation and perception (Louw & Edwards, 1997). Sensation in its simplest definition is the stimulation received via the senses (Louw & Edwards, 1997). The senses have been discussed in the previous section. Sensation is therefore the process through which the senses allow information to enter the individual (Louw & Edwards, 1997). In SI literature, sensation is similar to sensory acuity. Sensory acuity is the actual physical ability of the sensory organs of the individual's body to receive the incoming input (*SPD Network, Introduction to concepts*, 2006).

Perception follows the process of sensation gathering and the perception processes allow for the assignment of meaning to the sensory stimulation received from the environment (Louw & Edwards, 1997). The process of perception involves the selection, organisation and interpretation of the sensory stimuli (Louw & Edwards, 1997). Once again echoing previous discussions, sensory integration is what turns sensation into perception (Emmons & Anderson, 2005). As perception defines the reality for an individual, sensory integration defines the reality as what is that unique perspective of the world around that particular individual (Emmons & Anderson, 2005).

In conclusion, there is a difference between sensory processing and sensory acuity, although both functions are required within an individual for the brain to interpret information entering the body (*SPD Network, Introduction to concepts, 2006*). The term “sensory acuity” in the field of SI is similar to the term “sensation” in psychology literature. Furthermore, the term “sensory processing” in SI literature is similar to the term “perception” in the field of psychology. These similarities among the professional disciplines once again serve to prove the legitimacy of recognition of the concepts.

One central aim of all health professionals is to gain a better understanding of human beings in an attempt to better assist their patients/clients. Dunn (2001) states that one unique contribution that occupational therapy knowledge brings to the fore is within the understanding and meaning attached to the sensory experiences of individuals. This understanding of sensory processing followed by noting the impact on the individual’s function within his/her life aids us in further understanding being human. In defining the role of occupational therapists within the health team, Dunn states:

“We make the applications to daily life to which other disciplines only allude. We might characterize our role as translator: We stand in the space between abstract constructs and application to practice, looking back and forth translating for each group what the other has to say. Therefore, we can inform colleagues about the meaning of their research and families about their situations, enabling each group to advance their own thinking and ultimately advance knowledge overall.” (Dunn, 2001, p.609).

This was similarly stated by Emmons and Anderson (2005) who declared that they felt, as parents of children with SI challenges, that if they figured out more about the sensory challenges that they would be able to interact more positively and effectively with them, that they would then be able to improve the quality of their lives.

In the present study with university students at UWC, the researcher similarly endeavours to use occupational therapy knowledge to provide insight on the

learning encounters and challenges experienced by first year students, with similar ambitions in mind as expressed above.

#### **2.2.8.4. Model of Sensory Processing**

Dunn is a key theorist in the development of knowledge and understanding of sensory processing (Dunn, 1997). She developed the Model of Sensory Processing and the Sensory Profile assessment tools for different age groups. The Infant-Toddler Sensory Profile was developed alongside Debora Daniels in 1994 and published after numerous research studies related to validation of the assessment tool were conducted (Daniels & Dunn, 2000; Dunn, 1994; Dunn, 1997; Dunn & Brown, 1997; Ermer & Dunn, 1998). The principal component factor analysis research that was done on the Sensory Profile used in children assisted in the conceptualization of Dunn's Model of Sensory Processing (Dunn, 1997). More information about the studies that incorporated the Sensory Profile assessment tools will be discussed later in this chapter under the topic of the Sensory Profile.

The Model of Sensory Processing demonstrates a relationship between the individual's neurological threshold within the body and the behavioural response produced (Brown, Tollefson, Dunn, Cromwell & Fillion, 2001). A threshold can be defined as the point at which stimulation is strong enough to be noticed (Kosslyn & Rosenberg, 2006). A low threshold therefore refers to a great sensitivity for distinguishing a stimulus (Kosslyn & Rosenberg, 2006). According to the Model of Sensory Processing, on a neurological level the quadrants represent high and low poles (Brown, 2001). The high and low poles relate to the intensity of the thresholds.

The basic patterns of responding to sensory events in everyday life can be noted in the four quadrants in Dunn's model depicted in Table 1 below (*SPD Network-Introduction to sensory processing concepts*, 2006). The four quadrants are low registration, sensation seeking, sensory sensitivity and sensation avoiding (Brown, 2001).

**TABLE 1.**

**Dunn’s Model of Sensory Processing (Brown & Dunn, 2002, p.8)**

Neurological Threshold Continuum	Self Regulation Behavioural Response Continuum	
	Passive Strategies (Accordance) ↔ Active Strategies (Counteract)	
High (habituation)	<p>Low Registration</p> <p><i>Slow to respond, misses cues, easily adaptable to a variety of settings.</i></p>	<p>Sensation Seeking</p> <p><i>Creates sensations, looks for environments rich in sensory stimuli, easily bored.</i></p>
Low (sensitization)	<p>Sensory Sensitivity</p> <p><i>Readily notices or aware of sensory features of the environment, distractible.</i></p>	<p>Sensation Avoiding</p> <p><i>When bothered by stimuli engages in behaviours to limit sensory stimuli, does well with consistency, routine.</i></p>

The first quadrant within Dunn’s model is entitled “low registration” which suggests that the individual has a high neurological threshold to incoming stimuli (Dunn, 1997; Brown, 2001; Brown et al., 2001). In other words, a high degree of stimuli is needed for a behavioural reaction to be noted within the individual (Dunn, 1997; Brown, 2001; Brown et al., 2001).

The second quadrant within Dunn’s model is entitled “sensation seeking” and this is the behavioural strategy that counteracts the high neurological threshold of quadrant one (Brown, 2001; Brown et al., 2001). The behavioural responses are self-regulating strategies that can either be in accordance with the neurological threshold or counteractive of it (*SPD Network-Introduction to sensory processing concepts*, 2006). A counteractive behavioural manner indicates that the individual does not respond in line with his neurological threshold. *The Oxford dictionary* (1990, p.109) defines the word counteract as to reduce or prevent the effects of something and this is precisely what is meant by a counteractive behaviour.

In a scenario where the individuals are low registrators, they tend to immerse themselves in situations with lots of sensory stimuli to engage their nervous systems, as the term “sensory seeking” implies. An example of a low registrator is in the viewpoint of the olfactory sense, this person would be in the buffet line surrounded by the food, but doesn’t notice the smells of the food or may only notice the most pungent odours (Brown, 2001).

The lower quadrants within Dunn’s model relate to low neurological thresholds. Quadrant three is entitled “sensory sensitivity” and suggests that this individual’s behavioural response is in accordance with a low threshold. A low threshold tendency means that this individual becomes easily aware of sensory stimuli for a behavioural reaction to be noted (Dunn, 1997; Brown et al., 2001). A sensory sensitive individual, in the same viewpoint of the olfactory sense and being in a food buffet line mentioned in the example above, would quickly register and be able to distinguish between the different odours of food (Brown, 2001).

The fourth quadrant is entitled “sensation avoiding”. This refers to the behavioural strategy that counteracts the low neurological threshold (Brown et al., 2001). In this scenario the individuals who are sensory sensitive counteract by avoiding sensory situations, as the term “sensation avoiding” implies.

It is important to note that individuals can have responses at any point of the low and high neurological threshold continua (Brown, 2001). This is in relation to the different senses of the individual.

“Dunn’s Model of Sensory Processing depicts sensory processing preferences as stable traits; therefore, applying the model to adults is inherently reasonable.” (Brown et al., 2001, p.76)

The above quote supports the use of this model with adults and thereby links with the rationale for applying it to the university students within this present study.

#### **2.2.8.4. (i). Behavioural characteristics**

According to Brown (2001), each of the sensory processing preferences of the four quadrants has both assets and liabilities. Whether or not a preference is an asset or a liability is dependent upon the task, situation and environment (Brown, 2001).

Certain behavioural characteristics have been depicted according to each of the four sensory processing quadrants. The high neurological threshold individuals (low registrators) have typically been characterized by a slowness to respond or a missing of information (Brown, 2001). Individuals with low registration may be less aware of things happening within their environment than others (Brown, 2001). To emphasize once again, an individuals' sensory preference could be viewed as either an asset or liability, depending on the viewpoint one uses. One would assume that being less aware of input from the environment is a liability, but in the same instance, the asset of it is that individuals of the low registration type are generally good at tolerating a variety of different environments and they are able to maintain focus on tasks that they are interested in, despite distractions being present within the environment (Brown, 2001).

The second quadrant of the high threshold type (low registration type) is the sensation seeking type (Brown, 2001). The sensation seeking quadrant depicts behavioural characteristics that counteract the high neurological threshold (Brown, 2001). Individuals who are sensation seekers create or pursue environments that offer a variety of sensory input that are intense enough to cause the neurological system to respond to sensation (Brown, 2001). These individuals therefore tend to enjoy sensory experiences and have generally been noted to be curious (Brown, 2001). They are easily bored and have difficulty with situations where routines and structure are required (Brown, 2001). They therefore present with restlessness in sedate, quiet environments (Brown, 2001).

The low neurological threshold individuals (sensory sensitivity) have typically depicted behaviours of “sharp awareness of sensory features in the environment,

distractibility, and a tendency to be bothered or overwhelmed by sensory stimulation” (Brown, 2001, p.119). Individuals with high sensory sensitivity are “inclined towards strong attention to detail and an ability to detect stimuli that others don’t notice” (Brown, 2001, p.119). It can be imagined that these behavioural characteristics could be ideal in relation to professions or employment situations where this is required.

The fourth and final quadrant of the low threshold type is the sensation avoiding type (Brown, 2001). The sensation avoiding quadrant depicts behavioural characteristics that counteract the low neurological threshold (Brown, 2001). Individuals who are sensation avoiding display deliberate behaviours to block exposure to stimuli, in line with the type of stimuli they find overwhelming, namely stimuli that perhaps affect the individuals’ auditory or tactile system (Brown, 2001). These individuals desire control over situations to aid in their coping (Brown, 2001). They prefer consistency and ritual, and have good skills in creating structure or routine (Brown, 2001).

In order to practically consider the different behaviours described above, the following is an example of four students in a university setting, where each student features one of the four sensory processing types. The first student is seen taking lots of notes, not really trying to make sense of the information the lecturer is providing, but rather preferring to make sense of the information later. This could be an individual who is a low registrator, the first quadrant. The second student is chewing bubblegum, looking around and is wiggling in his chair. This could be an individual who is a sensation seeker, the second quadrant. The third student is observing the detailed overheads that the lecturer is making use of. This could be an individual who is sensory sensitive, the third quadrant. The last student is sitting in the front row of the class and enjoys the fact that the lecturer is keeping to the format structured. This could be an individual who is sensory avoiding, the fourth quadrant.

All of the above indicate where sensory tendencies relate to habits observed within individuals. Dunn, the developer of the Model of Sensory Processing described above as well as the Sensory Profile instruments that will follow below, indicated in research how the habits could be supportive of daily routines, and cumbersome whereby the habits interfere with daily routines within the individual's life (Dunn, 2000). This literature supports the idea of gaining an understanding of the sensory tendencies of university students as a means of advising, assisting and catering for their needs to afford them and the tertiary institution, academic success.

#### **2.2.8.5. Sensory Profile for adolescents and adults**

The Adolescent and Adult Sensory Profile (AASP) was developed in 1997 and published after validity research had been conducted (Brown, Tollefson, Dunn, Cromwell & Filion, 2001). The AASP is in the form of a self-questionnaire booklet with 60 questions related to individuals' daily experiences related to the five senses as well as the three 'hidden' senses, described previously. This standardized assessment provides a measure of the effects of sensory processing on the functional performance of individuals within their daily lives (*SPD Network, Technical Report, 2006*).

The AASP is based on the Sensory Profile (Dunn, 1999), the measure developed for use in young children between the ages of three and ten years (Brown & Dunn, 2002). Although many of the items from the Sensory Profile for children questionnaire were utilised for the inception of the AASP, modification of items occurred to allow the AASP to serve as a self-report and to deem the questions appropriate to an adolescent and adult age group (Brown & Dunn, 2002).

The AASP has been used in the present study to yield information about the first year students' SI profiles. It is important to note that in all occupational therapy research studies to date, reference to the obtained information from the Sensory Profile for children and the AASP has been termed the 'sensory profile' of the participants. The researcher however decided on the term 'sensory integrative profile' due to the fact that the present study spans the two fields of Health and



Education, and this term was better understood and conveyed what had been investigated.

Brown and Dunn (2002) warn that there are certain considerations to keep in mind when interpreting the AASP, which would then provide the SI profile scores.

Brown and Dunn (2002) assert that all sensory processing tendencies have advantages and disadvantages, and therefore, there can be no tendencies that can be viewed as inherently good or bad. The task at hand and the context of the environment could determine whether the particular sensory processing tendency would be advantageous or disadvantageous (Brown & Dunn, 2002). An example of this is that an individual who has high scores in the Sensory Sensitivity quadrant could then do well on tasks requiring precise sensory detections like a wine tester, however the disadvantage of this sensory processing tendency would be that the individual would be distracted in distracting environments such as a factory (Brown & Dunn, 2002).

Other considerations when interpreting the AASP are to view the entire pattern of scores across all the quadrants (Brown & Dunn, 2002). This is furthermore amplified by the fact that any combination of scores can occur (Brown & Dunn, 2002). Each of the four quadrants is independent and therefore any combination of scores is possible (Brown & Dunn, 2002). All scores are therefore telling and interesting, therefore the acquired low scores may be just as meaningful as high scores (Brown & Dunn, 2002). Within clinical situations whereby a health professional would administer the AASP to a client and thereafter utilise the obtained SI profile information for intervention purposes, the health professional would need to intensely observe the entire pattern across all of the four quadrants noting the scores pertinent to the clinical aspects requiring intervention.

Within the present study that deals with SI profile scores as well as academic marks or scores, the researcher utilised the obtained scores from all of the four quadrants, and conducted statistical analyses by correlating the scores of individual quadrants with the academic marks. More information about the

analysis of the obtained data of the present study will be presented in Chapter Three. The reliability and validity tests conducted during the development of the AASP will be discussed in more detail in Chapter Three. Research studies whereby the AASP or sensory profile characteristics were incorporated will be discussed below.

#### **2.2.8.6. The AASP in research**

Other research took into account the AASP questionnaire utilised amongst a general population, and a population with psychiatric illness, as will be described below. It is important to note that Brown (2001) emphatically proclaims that Dunn's (1997) Model of Sensory Processing was not intended to identify pathology. All individuals have patterns of sensory processing preferences with great degrees of variety amongst adults (Brown, 2001). Certain preferences however could possibly be associated with experiences associated with psychiatric disability and therefore such investigations were conducted (Brown, 2001). Catana Brown, who is co-developer of the AASP, conducted reliability and validity tests on the AASP, followed by item revision as well as research with people with psychiatric disabilities and those without (Brown & Dunn, 2002). Brown (1999, as cited in Brown, 2001) conducted a study whereby the AASP was used to examine differences in sensory processing for people with schizophrenia, bipolar disorders and those without mental illness. The study indicated that the schizophrenics presented sensory processing preferences for low registration (neurological threshold) and sensation avoiding (behavioural threshold) (Brown, 2001). The study furthermore indicated that the people with bipolar disorder had sensory processing preferences for sensation avoiding (behavioural threshold) (Brown, 2001). The persons without mental illness depicted sensation seeking (behavioural threshold) characteristics (Brown, 2001). Brown (2001) acknowledges that a large amount of variability was found amongst all the groups of individuals within this study, with the greatest variability existing amongst the schizophrenics. She therefore encourages replication of this study for more insights and confidence of the findings to be gained (Brown, 2001). Brown (2001) further states that for the persons with psychiatric pathologies, the gained

knowledge of the sensory processing preferences could provide them with practical information that could lead to supportive measures to aid wellness. Brown (2001) specifically indicates the value the sensory processing knowledge could have for occupational therapists in utilising strategies to address the sensory processing needs. The ideals expressed above by Brown (2001) are similar to the abstract views of the researcher of the present study, whereby the gained SI profile knowledge of first year university students could aid themselves and all university staff involved in providing assistance guided in part by their sensory processing characteristics. Similarly to the cautions expressed by the AASP developers, the instrument is not meant to diagnose pathology and thereby the university students could not be diagnosed in any particular and disadvantageous way.

Based on the above-mentioned research for validity purposes, Dunn (2001) furthermore proposed relationships between sensory processing and temperament and personality characteristics. The quadrant descriptions of the Model of Sensory Processing were matched with features within the temperament literature. Quadrant two, which is sensation seeking, was linked to a positive affect of temperament. Quadrant four, which is sensation avoiding, was linked to negative affect of temperament and emphasizes where an individual would limit sensory experiences. Quadrant three, which is sensory sensitivity, was linked to irritability of temperament, with the explanation that when irritable, the individual would be acutely aware of stimulation within the environment. Quadrant one, which is low registration, was linked to conscientiousness of temperament, whereby in both cases the individual would neglect noticing sensory stimuli, but within the temperament aspect it would be deliberately done as a way of completing a task. Dunn (2001) therefore proposed that the sensory processing aspects that linked to nervous system functioning could provide information to literature on temperament as to additional reasons for temperament characteristics and personality type. Apart from the validity testing that was conducted between the AASP and an instrument utilised to assess temperament in adults (Chess & Thomas, 1998, as cited in Brown & Dunn, 2002, p.55), no study had been

conducted to investigate the relationships between sensory processing and temperament in adults.

A recent study conducted by Rieke and Anderson (2009) determined the sensory processing differences between adults with obsessive-compulsive disorder (OCD) and adults from the general population using the AASP. The statistical analyses revealed that the adults with OCD expressed sensory sensitivity and sensation avoiding patterns to a greater extent than the general population.

The above accounts of research were directly related to the use of the AASP questionnaire within the studies. The following accounts indicate studies adhering to sensory processing matters in adults and older adults, however different instruments and research methods were utilised.

A study conducted by Kinnealey, Oliver and Wilbarger (1995) related to adults with sensory defensiveness. Since the AASP had not yet been developed, the researchers developed and used the Adult Sensory History Interview (Kinnealey, et al., 1995). Sensory defensiveness was defined by Wilbarger and Wilbarger (1991) as reacting negatively to sensory input that generally is seen as harmless. Wilbarger and Wilbarger are known for their work in occupational therapy with children with sensory challenges. Kinnealey, et al., (1995) presented findings of the sensory challenges the participants of the study encountered and the challenges within their daily life experiences in combating the sensory challenges such as tactile defensiveness, which had been common in all the participants of their study. These participants needed to engage in mechanisms to cope with their sensory challenges and these experiences were documented by the researchers (Kinnealey, et al., 1995). The information gained from this study led to frameworks developing that could enhance the understanding of sensory defensiveness and that could aid in coping within individuals, by utilising strategies such as mental preparation (Kinnealey, et al., 1995). The gained insights from this research gave rise to the expansion of research and studies

within matters of sensory processing that led to the development of the AASP in 1997.

Pfeiffer and Kinnealey (2003) conducted a similar study to establish whether there was a relationship between sensory defensiveness and anxiety among adults between the ages of 20 and 65 years of age. The researchers utilised the Adult Sensory Questionnaire and the Adult Sensory Interview to gain an indication of sensory defensiveness, and the Beck Anxiety Inventory to measure anxiety. Pfeiffer and Kinnealey (2003) were able to prove a relationship between sensory defensiveness and anxiety. The sensory processing topic was engaged within research and within an adult population, which has some relation to the present study in that the population were also adolescents and adults as well as the fact that sensory processing abilities were investigated. Although Parham is a valued researcher within the field of SI, her studies were primarily in children and thus far only one study encompassed sensory processing that is in line with the focus area of the present study. Johnson-Ecker and Parham (2000) conducted a study to examine the validity of the sensory history questionnaire. The participants of the sample were parents of children with sensory integrative dysfunction and parents of children who were 'typically' developing (Johnson-Ecker & Parham, 2000). Although Parham had previously been acknowledged for her contribution to the field of SI, she however did not conduct research related to SI profiles or with adult populations.

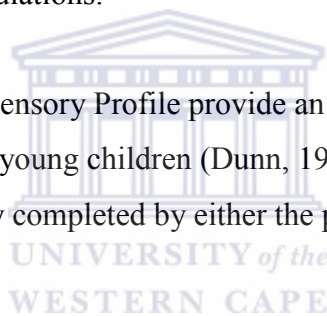
The following studies indicate how the change to elements within the environment could positively and negatively affect the individuals within that environment. Research studies regarding the use of sensory integration strategies with an adult population can be seen in the study conducted by Ragneskog and Kihlgren (1997) who found that introducing auditory stimuli within the environment had an impact on the level of cognitive awareness on patients suffering from dementia. The findings further included that background music assisted in calming the patients, whereas the more uncontrolled sounds provided increased their agitation (Ragneskog & Kihlgren, 1997). Denney (1997) then

conducted a similar study within a rehabilitation unit and found that the persons displayed 57% less agitation after a week of quiet music in the dining room. The patients' negative behaviours were noted when the music was stopped and the negative behaviours lessened when the music was reintroduced (Denney, 1997). This research provided evidence on the impact of music and thereby sounds on cognitive states of older adults.

#### **2.2.8.7. Sensory Profile for children**

The following section will review literature on the Sensory Profile instrument used in studies with children. This instrument led to the development of the AASP. Secondly, the following section will depict the degree of research that had been conducted with children; however a disparity exists in studies with adolescent and adult populations.

The Infant and Toddler Sensory Profile provide an indication of the sensory processing tendencies of young children (Dunn, 1999). The Infant and Toddler Sensory Profile is usually completed by either the parents or care-givers of the children (Dunn, 1999).



According to Daniels and Dunn (2000), prior to the development of the Infant and Toddler Sensory Profile, there had been various measures to assess development and behaviour in infants and toddlers. A commonly used tool was the Sensory Rating Scale for Infants and Young Children by Provost and Oetter (1993). Daniels and Dunn (2000) reported that the above-mentioned tool provided a comprehensive assessment of sensory functioning in infants and toddlers age groups; however it comprised 138 items that made it lengthy and thereby very time-consuming for parents and caregivers to complete. Daniels and Dunn (2000) furthermore related that there were no reported studies using this tool with infants and toddlers with developmental disabilities. All of the above related to the need for a newer tool, which in essence culminated into the Sensory Profile (1994) and thereafter the Infant and Toddler Sensory Profile version (2000).

The Sensory Profile was developed by Dunn, approximately in the year 1994, as revealed in the published article whereby an item analysis was conducted with a group of “typical” children. Dunn (1994) classified the term “typical” as children who were not taking any medication for conditions related to attention spans and seizures. The Sensory Profile was developed in utilising previous measurement tools within the field of sensory integration, such as “sensory histories” and sensory processing tests such as the Southern California Sensory Integration Tests developed by Ayers in 1972.

Dunn (1994) therefore utilised the Sensory Profile questionnaire with a sample of what has been described above as typical children. A total of 64 children between the ages of three and ten years were incorporated in the study. The Sensory Profile questionnaire consisted of 99 items that were set according to six sensory categories and two behavioural categories. A 5-point Likert scale was set as response categories.

The parents of the sample group completed the Sensory Profile and the data obtained was then utilised for statistical analyses to gain information about the sample and appropriateness of the items of the Sensory Profile. Some of the findings of the study included the usefulness of the Sensory Profile tool and that it held merit for being able to document progress made by children after occupational therapy intervention.

The Sensory Profile was revised in 1996 by Dunn and Westman and the findings were published in 1997. The revised version of the Sensory Profile comprised 125 items. Dunn and Westman (1997) conducted research using the revised Sensory Profile with a national sample of children without disabilities. Similar to the previous research discussed above, the children were between the ages of three and ten years. The following information is about the Dunn and Westman study in 1997. A total of 1112 completed Sensory Profiles were obtained due to the fact that a national population was incorporated in this study. One hundred sixty-six qualified occupational therapists assisted in this study by acquiring participants to

complete the Sensory Profile questionnaire. In summary the findings of the study indicated that the Sensory Profile contained many items that were uncommon in children without disabilities. This finding then indicates that the tool could be useful in allowing the discrimination of behaviours of children with and without disabilities.

Dunn and Brown (1997) later reported findings of the factor analysis that was conducted on the above-mentioned data obtained from the sample of children without disabilities. A factor analysis allows the identification of relationships amongst items that are performing similarly (Dunn & Brown, 1997). One key finding of this study was that certain factors were identified in the sample of children without disabilities and these factors are usually evident in children who have various disabilities (Dunn & Brown, 1997). This gained information is obviously important within the clinical situation of implementing occupational therapy intervention with children. Case-Smith (1997) continued research on the above-mentioned topic whereby she attempted to gain a clinical interpretation on the findings of the factor analysis study conducted by Dunn and Brown (1997). Case-Smith (1997) related the factor analysis findings to the child's temperament and social skill development. Case-Smith (1997) aided in providing evidence of the Sensory Profile in clinical situations and that the gained information about the sensory needs of the children would aid in structuring the environment to meet those needs. These are the beliefs held by the researcher of the current research study, in that a gained understanding of the Sensory Profile of university students could aid in structuring the university environment to meet those needs and be of benefit to all involved.

In 1998 Case-Smith and other research colleagues conducted a study that focussed on similar aspects to the research discussed above. The study looked at the sensory responsiveness and temperament; however the age group under focus was much younger, namely preterm infants (Case-Smith, Butcher & Reed, 1998). The preterm infants' sensory responsiveness was compared with full-term infants and furthermore the relationship to temperament was investigated (Case-Smith, et al.,



1998). Some of the results of this research indicated that the preterm infants displayed more incidence of tactile defensiveness as compared to the full-term infants (Case-Smith, et al., 1998). This research has been included to display the importance of sensory processing and responsiveness in individuals, and that the gained knowledge would aid the development of intervention strategies. The research has also been included to showcase the various avenues that have been explored in research studies related to sensory processing.

After the above mentioned studies that incorporated the revised Sensory Profile, more research studies followed. A discriminant analysis of the Sensory Profile was conducted by Ermer and Dunn (1998). This study comprised a sample of children with disabilities, Autism or Pervasive Developmental Disorder (PDD), and attention deficit hyperactivity disorder (ADHD), as well as a sample of children without disabilities. The results indicated that the Sensory Profile tool contained factors that discriminated between the children with disabilities and those without (Ermer & Dunn, 1998). The results furthermore provided evidence that the Sensory Profile is an effective tool that could be utilised to establish the similarities and differences in the patterns of children with disabilities and those without disabilities. The knowledge gained from the Sensory Profile serve to provide more precise assessments and thereby more accurate intervention.

Prior to the research conducted by Ermer and Dunn (1998), Kientz and Dunn (1997) similarly conducted a study involving the Sensory Profile. The study was to compare the performance of children with Autism, with children without Autism. The results of this study indicated that 85% of the Sensory Profile questionnaire accurately differentiated between the autistic children and those without Autism.

The revised Sensory Profile tool was used in research conducted by Daniels and Dunn and the findings reported in the year 2000. The research by Daniels and Dunn was to enable the revision of the measure that led to the development of the Infant and Toddler Sensory Profile. The research was implemented with 100

parents or caregivers of children aged from birth to three years. These participants were requested to complete the Sensory Profile. A total of 76 completed and returned the questionnaire. These participants then also marked off which items they felt were developmentally inappropriate for their children. The information obtained indicated that the majority of items for the age groups of birth to 18 months were developmentally inappropriate. The items that had shown up as inappropriate were within the sections of “movement, touch, multisensory processing, oral-motor processing, and social-emotional behaviours” (Daniels & Dunn, 2000, p.88).

The items were either deleted or rewritten. Dunn’s (1994) Model of Sensory Processing was used to guide the creation of new developmentally appropriate items. Experts were then included to review the items. After these measures were implemented, the final revisions were completed and this was then the Infant and Toddler Sensory Profile to be utilised with this younger age group (Daniels & Dunn, 2000).

The Sensory Profile is still successfully utilised in research and clinical practice as evident in the Dunn and Bennett (2002) study examining the sensory processing patterns in children with Attention Deficit Hyperactivity Disorder (ADHD). The findings of this (2002) study similarly advocate the benefits of utilising the Sensory Profile as a tool to aid the assessment and intervention of children with ADHD. The Sensory Profile seems to be gaining momentum as evidenced by the fact that it has been translated into Hebrew. The Hebrew version of the Sensory Profile underwent a multi-step process, like the translation thereof, followed by back-translation to ensure that what was expressed within the Hebrew version was identical to the Sensory Profile (Neuman, Greenberg, Labovitz, & Suzuki, 2004).

The Sensory Profile questionnaire was utilised in a research study that focussed on children termed as “gifted” (Gere, Capps, Mitchell, & Grubbs, 2009). The following information has been sourced from the study by Gere, et al., (2009). The term “gifted” refers to individuals, in this case children, of above normal

intelligence. Some of the reasons for the study with these participants were that these children were noted as having sensory sensitivities. These sensitivities were noted in the studies by Deary (1994) and Deary, Bell, Bell, Campbell, and Fazal (2004), who investigated sensitivities and intelligence. The findings of those studies were that there were strong correlations between levels of cognitive functioning and sensory sensitivities (Deary, 1994; Deary, et al. 2004). As has been discussed earlier, when having a profile of sensory sensitivity, the vulnerability could be the individual's body system becoming overloaded by the sensory input from the environment. The tendency of becoming overloaded was found within the study with gifted children (Gere, et al., 2009). The above information has not merely been included due to the fact that the Sensory Profile questionnaire had been used in a recent study, but also due to the fact that research had been undertaken to note sensory sensitivities and relations to learning and intelligence. These studies discussed within this section however, had been with children whereby the present research similarly looked at academic achievement, yet with an adolescent and adult university student population. Dunn (2009) was invited to deliver commentary on the study conducted by Gere, et al. (2009) with gifted children and she echoed the value of different professional disciplines utilising occupational therapy tools as a means of widening knowledge bases as well as indicating that occupational therapy is not merely for those classified with specific disabilities. The use of the AASP within the present study therefore is in line with showcasing the use of occupational therapy tools with diverse populations. More information about Sensory Profile questionnaires for the age group of children will continue below.

After the Sensory Profile questionnaire, a newer instrument had been developed and this is the Sensory Experiences Questionnaire (Baranek, 1999). Baranek, David, Poe, Stone, and Watson (2006) used the Sensory Experiences Questionnaire (SEQ) in a study with children who had disabilities, Autism and developmental delays, and children without disabilities. This (2006) study indicated that the young children with autism showed high levels of sensory processing challenges as well as being under-responsive in social and non-social

contexts. Similar to the Sensory Profile, the SEQ is administered to parents or caregivers of the young children.

A qualitative study was conducted by Dickie, Baranek, Schultz, Watson, and McComish in 2009 whereby the sensory experiences of preschool children with and without Autism were conducted. This research served to delve deeper into the sensory processing challenges experienced by Autistic children. This is the reason for the selection of qualitative research methods as a means of understanding the experiences of these children. The qualitative methods included the use of interviews with the parents of the children. The SEQ had however been administered to the children prior to embarking on the qualitative study.

All of the above literature has been included to discuss the repertoire of SI tools available, linking to the AASP that has been incorporated as the research tool within the present study with adolescents and adults. The use of the different SI tools in research studies have also been reviewed to emphasize the aspects of sensory processing and how important it has come to be across the various age groups. The importance of sensory processing is the rationale for the significance placed on it within the present study.

#### **2.2.9. Summary about the ‘person’ construct**

The preceding literature sources have been included as part of the first construct of the PEO model, namely the ‘person’. In the context of this research study, the person referred to the first year university student. The literature included was therefore about the university student, the challenges they experience on entering the university setting that in many cases could lead to dropping out of university studies. The concepts of the identity of the student, theories about identity development as well as the different aspects of identity have been discussed. Matters of learning, learning styles and intelligences, that have an incredible impact on a university student within an academic environment of the university have similarly been unpacked within this literature review. The research

incorporated the perspectives and questionnaires from the field of sensory integration (SI). These matters were therefore discussed at length, in relation to similar and other research studies conducted and the present research.

### **2.3. Environment**

The second dimension of the PEO model is the environment. There are certain assumptions related to the environment, such as the impact it could have on the occupational performance of an individual (Letts, et al., 2003). The environment surrounding an individual is continually changing and these changes necessitate change within the individual for optimal occupational performance to be achieved (Letts, et al., 2003). Due to these changes, the environment could either enable the performance of an individual or be a constraint (Letts, et al., 2003). It is believed that the environment is more able to change than the individual (Letts, et al., 2003), which is in line with the sensory processing literature that characterises an individual's sensory profile as stable traits (Brown & Dunn, 2002). In line with these notions, the most favourable scenario would be for the environment to be enabling for the individuals within it.

Brain-based literature regarding learning states that even if a child were to be born with the genetics of a would-be genius, if this child were to be raised in a non-enriched environment, the chances of this child achieving genius are very low (Jensen, 2000). By the same token, should an average rated child, with such a genetic make-up be raised within a stimulating and supportive environment, the chances for achievement are maximised (Jensen, 2000). In this example, the impact of the environment on the potential of an individual can be clearly seen.

In the context of the present study, the environment relates to the university setting and structures, academic lecturers and staff within the environment.

## **2.4. Occupation**

The third dimension of the PEO model is occupation. The word ‘occupation’ can denote many things and is most commonly used to refer to one’s vocation or related to business aspects (*Oxford Dictionary*, 1990). The occupational therapy perspective of occupation follows below.

### **2.4.1. Occupational beings**

An individual’s occupation is the construct utilised by occupational therapists to view their clients in order to gain an understanding of them (Molineux, 2004). An occupational therapist’s standpoint transcends the belief that an individual’s occupation is merely something that is important to his/her life, but more so that the individual should be viewed as an occupational being (Molineux, 2004). Due to occupational therapy paradigm shifts and developments, health and ill health are also furthermore viewed in relation to an occupational perspective (Yerxa, Clark, Jackson, Parham, Pierce, Stein & Zemke, 1989, as cited in Molineux, 2004, p.4). Any challenges experienced by the individual would then also be related to an occupational perspective and termed occupational dysfunction (Molineux, 2004).

This occupational therapy perspective of the occupation of individuals has brought about a shift in thinking, whereby occupation and identity are no longer viewed as separate entities, but rather combined as the notion of the “occupational identity” of an individual (Rudman & Dennhardt, 2008). The occupational identity would then be a particular dimension of the larger construct known as an individual’s identity.

By an individual acquiring their SI profile, this would serve as them gaining another aspect of their identity. Within the present study whereby students would potentially gain their SI profiles, this would aid them in gaining one aspect of their identity. As previously mentioned, developmental theorists like Erikson list the search for identity as an important phase within the adolescent phase of an individual’s life.

### **2.4.2. Occupational performance**

Law, et al. (1996) conceptualized occupational performance as being the outcome of the transaction between the person, environment and occupation. An individual's occupation relates to the performance of all daily activities related to the three performance areas of activities of daily living, work and productive activities and play and leisure (Neistadt & Crepeau, 1998). The degree of engagement, and participation within the aspects of the individual's occupation, would be referred to as the occupational performance.

An occupation has furthermore been defined as an individual's personally constructed experience within a unique context (Pierce, 2001, as cited in Molineux, 2004, p.72). The level of performance can be attributed or determined by the individual and related contextual constructs.

The concept of occupational balance has also previously been discussed by means of the study conducted by Wilson and Wilcock (2005), who implemented the concept of occupational balance with first year students in Britain. Occupational balance in the context of providing satisfactory occupational performance within the individual's life is ultimately what the researcher envisions as a benefit to students, in the long run, by them gaining the knowledge of their SI profiles. What is meant by this statement is that the students would be able to make better informed choices within their daily lives about their interaction with sensation and that these choices may then assist them in gaining a balance of activities in their lives.

Occupations are therefore the self-directed tasks and activities in which the individual partakes in order to meet intrinsic needs for self-maintenance, expression and fulfilment, within the variety of roles they have within their lives (Letts, et al., 2003).

In the context of the present study, the "occupation" refers to the learning tasks required of the "person" who is the first year student from the FCHS at the UWC.

The tasks would include the content of the lecture modules and the delivery of lectures.

## **2.5. Summary of chapter**

In this review, the researcher has presented the multifaceted and complex nature of the literature surrounding SI, health, education, learning, and occupation. However, the ultimate focus is on the sensory processing capabilities of the select sample under investigation, first year UWC students, by means of acquiring their SI profile tendencies. Academic achievement is the other construct employed in an attempt to understand the interplay between the SI profiles and academic achievement of the student at university.





# **CHAPTER THREE**

## **RESEARCH DESIGN AND METHODOLOGY**

### **3.1. Introduction**

This chapter serves to explain the research methodology employed in conducting this study. The chapter outlines the research design, the research approach and the research aims and objectives. The research methods provide a description of the research setting, population and sample, as well as the data collection methods and analysis.

### **3.2. Research Aim**

The aim of the study was to determine the sensory integrative (SI) profiles of students, and whether there was a relationship between the SI profiles and academic achievement of first year students from the Faculty of the Community and Health Sciences (FCHS) at the University of the Western Cape (UWC).



### **3.3. Research Objectives**

1. To determine the SI profile characteristics of first year FCHS students.
2. To determine the academic achievement of first year FCHS students through their matriculation (grade 12) marks and first year university marks.
3. To determine the relationships between SI profiles and socio-demographic factors of first year FCHS students.
4. To determine the relationships between the SI profiles and academic achievement of first year FCHS students.

#### **3.3.1. Variables**

- Relating to research objective 1: the SI profile characteristics relate to the neurological and behavioural thresholds.

- Relating to research objective 2: the matriculation marks used were for English and Mathematics. The university academic marks were for the first semester module - Primary Health Care (PHC), and the second semester module - Introduction to Philosophy of Care (IPOC).
- Relating to research objective 3: the socio-demographic factors included gender, race, age, living arrangements, and home classification.

### **3.4. Research Design**

#### **3.4.1. Research paradigm**

Research paradigms and the methodological approaches stem from metatheoretical traditions. A metatheory can be seen as the scientific position or stance to which researchers ascribe (Babbie & Mouton, 2007). The three most influential metatheoretical traditions are the positivist, the phenomenology, and the critical theory (Babbie & Mouton, 2007).

The positivist tradition supported the idea that social science research should follow the reasoning of the natural sciences (Babbie & Mouton, 2007). A key stance of the positivist tradition is the scientific viewpoint and thereby the rejection of any form of religious or metaphysical knowledge (Babbie & Mouton, 2007). In relation to the scientific view that is characteristic of positivism is the emphasis of objectivity and distance between the subjects and objects (Babbie & Mouton, 2007). This metatheoretical tradition can therefore be linked to the quantitative research paradigm that has a similar basis. The present study prescribes to the positivist metatheoretical tradition and follows the quantitative research design.

Quantitative research aims to classify features, utilise numbers and construct statistical models to derive meaning to the observations (Babbie & Mouton, 2007). In quantitative research, the researcher plans in advance precisely what he/she is seeking, followed by careful planning of all the steps of the research and

statistical analysis, prior to collecting the data (Babbie & Mouton, 2007). The tools implemented to collect quantitative data are normally in the form of questionnaires or equipment in line with collecting numerical data (Louw & Edwards, 1997). The present research study utilised a questionnaire, the Adolescent and Adult Sensory Profile (AASP), to collect the data.

A key stance of quantitative research is that the researcher strives to remain objective and separate from the subject matter, thereby the utilization of precise numerical and statistical applications (Kosslyn & Rosenberg, 2005). The critique of quantitative research is that it may miss important contextual detail due to its strict focus, however in a positive light it can be quicker and enables the collection of large amounts of data from different sources (Ogunniyi, 1992). Due to the data being summarized by numbers connected to specified important features of the data and about the subject under investigation, statistical aggregation of the data is facilitated and comparisons allowed, thereby allowing findings to be generalised (Antonius, 2003).

The present study followed the quantitative research paradigm, due to the fact that quantitative measurements of assigning numbers were utilised in describing human behaviour. Quantitative research quantifies relationships between variables (Hopkins, 2000). A variable is an attribute that expresses a construct by means of different values (McMillan & Schumacher, 2006). Relationships between variables are expressed using statistics, correlations, relative frequencies and differences between means (Hopkins, 2000).

In the case of the present study, the quantitative paradigm seemed ideal to the investigation of the SI profile tendencies of the first year FCHS students. The aim was to gain SI profile data from as many students as possible within the study population and to be able to generalize the obtained findings. The large number of participants relates to the fundamentals of the quantitative research paradigm.

In the quantitative research paradigm there are two types of studies, namely descriptive and experimental (Hopkins, 2000). Descriptive studies are also called observational, because subjects are viewed or observed without intervening (Hopkins, 2000). Descriptive studies therefore clearly stipulate that no attempts are made to change behaviour or conditions. The present study is of the descriptive type of the quantitative research paradigm.

There are approximately five different types of descriptive studies namely case studies, case series, cross-sectional, prospective or longitudinal, and case-control studies (Hopkins, 2000). The present study is cross-sectional in terms of the time dimension, because several factors were assessed at a particular time. These factors were the sample's SI profiles, socio-demographics, academic achievement relating to the matriculation marks and first year university marks.

Hopkins (2000) also specifies that in attempting to identify a relationship or the absence of a relationship, a cross-sectional or case-control study can best be implemented to provide evidence to this effect. The present cross-sectional study is therefore deemed appropriate for identifying whether there is a relationship between SI profiles and the academic achievement of the first year university students. The study design similarly will aid in identifying the relationship between the socio-demographic factors and the SI profiles of the sample.

The present study is non-experimental because there has been no manipulation of any variables, whereas the most defining characteristic of experimental research is the manipulation of a variable. The study was the correlational type of non-experimental research design. McMillan and Schumacher (2006) describe correlational research as assessing relationships between two or more phenomena, which links to the aim of investigating a relationship between the SI profiles and academic achievement. The present study has the SI profiles as the independent variable and academic performance of the university students as the dependent variable.

Due to the descriptive and exploratory nature of the present study, attempts were made to explore any and all relationships between the SI profiles and academic achievement of the first year students. The relationships between socio-demographics and SI profiles were also explored. For this study, variables like age, gender, race, that may be associated with the dependent or outcome variable (academic achievement) have been included for analysis.

### **3.5. Research Methods**

#### **3.5.1. Setting**

As discussed in the Introduction (Chapter One) the setting for the study was UWC, more specifically the Faculty of Community and Health Sciences (FCHS). The FCHS is one of the seven faculties at UWC. The FCHS comprises a total of nine professional programmes, namely Dietetics, Human Ecology, Natural Medicine, Nursing, Occupational Therapy, Physiotherapy, Psychology, Social Work and Sport, Recreation and Exercise Science. Data was obtained from a sample of students from all of the above-mentioned professional programmes.

#### **3.5.2. Population and sample**

The non-probability sample design was implemented, as non-probability signifies that the probability of selecting certain elements from the population is not known (McMillan & Schumacher, 2006). The population comprised all undergraduate first year students in the FCHS, registered in 2008.

The stratified sampling type was utilised. Stratification indicates any method of grouping the population into subgroups, or strata, before sampling (McMillan & Schumacher, 2006). The division into subgroups before sampling was done by stratifying the first year students according to the nine professional programmes within the FCHS, before commencing access for data collection.

A representative sample of first year students from the FCHS was obtained after the stratification of the population according to the nine professional programmes. As mentioned above, a demographic description of the sample will be presented in detail in Chapter Four. According to the UWC Information and Communication Services (ICS) printouts, the population size was anticipated as being about 950 individuals from the FCHS. However, during the process of sampling when participants were recruited as stratified per the nine professional programmes of the FCHS, the actual size of the population was found to be 593 in total.

In applying Yamane's formula (Israel, 1992)  $n = \frac{N}{1 + N(e^2)}$  to calculate the sample size,

whereby  $n$  stands for sample,  $N$  for study population and  $e$  is equal to 0.05, at least 399 students were needed to be represented within this study. However, the final sample size of 357 students falls short of the recommended sample size, therefore the research findings cannot be seen as representative of the larger population under study.

### **3.5.2.1. Sampling procedure**

In acquiring respondents for the study, the researcher made attempts to acquire as many participants from the nine professional programmes as possible by asking for volunteers during classes. Students were informed about the purpose of the research study and the expectations for them to complete a questionnaire. The students were not pressurised or required to partake in the study, thereby ensuring voluntary participation. The students were then informed of the separate timeslots of when they could complete the questionnaires should they wish to participate in the study.

### 3.5.3. Instrument

The Adolescent and Adult Sensory Profile (AASP) questionnaire (Brown & Dunn, 2002) as well as a demographic questionnaire designed by the researcher comprised the self-administered questionnaire that was utilised in this study.

The AASP questionnaire (Brown & Dunn, 2002) consists of two parts that are completed independently. The first part of the questionnaire comprises 60 questions related to participants' daily experiences of sensory input (*see Appendix 1*). The questions are divided into six sections representative of sensory processing categories. These sections are as follows: (A) Taste/Smell Processing, (B) Movement Processing, (C) Visual Processing, (D) Touch Processing, (E) Activity Level and (F) Auditory Processing. The questionnaire encompasses a 5 point Likert scale for the participants' responses as: (1) almost never, (2) seldom, (3) occasionally, (4) frequently and (5) almost always. The 5-point Likert scale represents 5 as the behaviour almost always performed and a number 1 represents the behaviour is almost never performed (Rieke & Anderson, 2009). The Likert scale was designed by Rensis Likert as a measure for standardized response categories in survey questionnaires (Babbie & Mouton, 2007).

The second part of the AASP questionnaire is a score calculated by the researcher based on the responses from participants on the first part of the AASP, namely the 60 questions. The score calculations were done using Excel. The total scores obtained by each participant were structured into four quadrant grids that are related to Dunn's (1997) four quadrant Model of Sensory Processing. These quadrants are as follows: (1) Low Registration, (2) Sensation Seeking, (3) Sensory Sensitivity and (4) Sensation Avoiding. The obtained score indicates the participant's sensory profile, referred to as the SI profile within the present study.

The demographic questionnaire featured questions related to the participants' background information of age, gender, race, course of study, residence while studying and home setting information (*see Appendix 1*).

The questionnaire was loaded onto an electronic research device called a palm-pilot that aided in the collection of the data. The palm-pilot device, also known as a personal digital assistant (PDA) is a handheld computer that resembles a cell phone in its appearance. The palm-pilot similarly has a screen where the questions of the questionnaire show and the palm-pilot keys where the participants indicate their responses to the questions. More information about the palm-pilot devices follows below, under section 3.6 Procedure.

#### **3.5.3.1. Adaptations to Instrument**

Prior to the implementation of the AASP questionnaire with a South African population, a fellow researcher, Annemarie Lombard, was consulted as she had utilised the AASP questionnaire in her doctoral study with an adult South African population (A. Lombard, personal communication, May 1, 2007b). Lombard has legal permission from the American Psychological Corporation, Harcourt Assessment Company, for substituting two words within the AASP questionnaire: the word “candy” was substituted with the word “sweets” for the South African population and the word “apple sauce” was substituted with “maize porridge” to denote the relevance to a particular texture within that question of the AASP questionnaire. As this was deemed relevant with a South African population, these adaptations were used in the present study. During the pilot phase of this study, the above word substitutions were also monitored and found to be suitable. The pilot phase will be described later under section 3.6.1 Pilot study.

#### **3.5.4. Reliability and validity of instrument**

Brown and Dunn (2002) developed the AASP questionnaire and during the first item reliability testing, the internal consistency estimates for each of the quadrants were as follows: Quadrant 1 (Low Registration) had an Alpha coefficient of 0.82; Quadrant 2 (Sensation Seeking) 0.79; Quadrant 3 (Sensory Sensitivity) 0.81 and Quadrant 4 (Sensation Avoiding) 0.66.

In Brown & Dunn’s study (2002), items within the AASP were revised and thereafter the AASP was administered to a large sample of adolescents and adults



in order to develop the classification system and cut scores. A cut score can be seen as the limits or constrictions. Standardization studies followed and the classification system produced cut scores and results as follows. The first cut score was termed “Much less than most people” and the results were less than 2% of the study population. The second cut score was termed “Less than most people” and the results were between 2% and below 16% of the study population. The third cut score was termed “Similar to most people” and the results were between 16% and 84% of the study population. The fourth cut score was termed “More than most people” and the results were between greater than 84% and 98% of the study population. The fifth cut score was termed “Much more than most people” and the results were greater than 98% of the study population. Further testing revealed the internal consistency estimates of reliability for each quadrant as alpha ranging between 0.64 and 0.78, which can be seen as very consistent (Brown & Dunn, 2002, p.52).

In terms of validity of the AASP, during the development of the AASP, a panel of five experts reviewed the items of the AASP to determine whether it could be categorised according to Dunn’s (1997) quadrant Model of Sensory Processing (Brown, Tollefson, Dunn, Cromwell, & Filion, 2001). The steps implemented seem to relate to the objectives of face validity as well as construct validity; due to the fact that Dunn’s Model (1997) was the theory utilised to draw comparisons with the AASP instrument. Following the above validity research, adjustments were made to the AASP (Brown & Dunn, 2002). The validity testing ensured that the items were placed appropriately within the quadrants according to Dunn’s Model (1997) of Sensory Processing. Validity evidence deemed the sample appropriate in terms of age ranges of adolescents and adults’ sensory processing behaviours (Brown & Dunn, 2002). The above-mentioned research involved people from the general American population and provided evidence that supports the concepts from Dunn’s Model (1997). Factor analytic and psychophysiological studies supporting the construct validity of Dunn’s model was achieved (Brown, et. al., 1997; Dunn & Brown, 1997; Dunn & Daniels, 2002; McIntosh, Miller, Shyu, & Dunn, 1997; as cited in Rieke & Anderson, 2009).

A study was conducted to provide evidence of convergent and discriminant validity for the AASP (Brown & Dunn, 2002). The study conducted was a comparison of scores of the AASP with scores obtained from the New York Longitudinal Scales (NYSL) Adult Temperament Questionnaire (Chess & Thomas, 1998). Correlations between the two instruments were examined and revealed those of moderate strength (0.30 and above,  $p < 0.001$ ).

Evidence of discriminant validity is achieved by studying the relationship between scores from the instrument under investigation, the AASP in this instance, and another measure, the NYSL questionnaire, utilised to be measuring a different, or peripherally related, construct (Brown & Dunn, 2002). It is stated that if the correlations are lower than those obtained for convergent validity, then this pattern helps validate the test (Brown & Dunn, 2002). The correlation findings between the subscales of the two instruments, NYSL questionnaire and AASP, were weak, thereby proving discriminant validity (Brown & Dunn, 2002). It was also found that the Low Registration quadrant of Dunn's Model (1997) of Sensory Processing could be seen as unique (Brown & Dunn, 2002).

Evidence of convergent validity is similarly achieved by studying the relationship between scores from the instrument under investigation, the AASP, and another measure, the NYSL questionnaire, used to measure similar constructs (Brown & Dunn, 2002; *SPD Network, Technical Report, 2006*). Correlations were found between the quadrants of the AASP and at least two of the NYSL questionnaire (Brown & Dunn, 2002; *SPD Network, Technical Report, 2006*). The findings were that the correlations fell in the expected direction and supported the AASP quadrants (Brown & Dunn, 2002). Unexpected findings were that AASP quadrants displayed correlations with 'mood' of the NYSL questionnaire (Brown & Dunn, 2002). Although this correlation finding was not anticipated, it could be understood in that the AASP quadrant number two of Sensation Seeking can be seen as associated with pleasurable mood, and AASP quadrant numbers three and four, Sensory Sensitivity and Sensation Avoiding, can be related to a more serious

mood when the person is negatively affected by sensations (Brown & Dunn, 2002). The above-mentioned study that considered validity of the internal aspects of the instrument could be categorised as relating to the one major type of validity testing, namely criterion-related validity. This is due to the fact that criterion-related validity takes into account the instrument (AASP) in line with an external instrument, namely the NYSL questionnaire.

As previously mentioned, Brown, Tollefson, Dunn, Cromwell and Filion (2001) conducted a study to provide further evidence of convergent validity, whereby they compared AASP responses to the physiological responses of participants by means of skin-conductance test measurements. Twenty participants were selected from a sample of eighty American undergraduate students who had completed the AASP (Brown, Tollefson, Dunn, Cromwell & Filion, 2001). The findings indicated that there was a significant difference observed in the skin-conductance responsivity amongst the four AASP quadrants (Brown, Tollefson, Dunn, Cromwell & Filion, 2001). As could be expected, due to the low threshold classifications, Sensory Sensitivity and Sensation Avoiding quadrants were more responsive (Brown, Tollefson, Dunn, Cromwell & Filion, 2001). The similarities proved convergent validity of the AASP (Brown, Tollefson, Dunn, Cromwell & Filion, 2001).

Clinical validity basically refers to the instrument under investigation, firstly being of a clinical nature, being utilised in research whereby the scores of an asymptomatic group of individuals is compared to a group of individuals of a symptomatic or pathological group (Schindler, Mozzanica, Ginocchio, Peri, Bottero & Ottaviani, 2009).

Clinical validity tests have also been conducted on the AASP. Clinical validity evidence was obtained by looking at past research regarding the sensory processing abilities of individuals diagnosed with different mental illness, namely Schizophrenia and Bipolar Disorder, and those without (Brown & Dunn, 2002).

Findings revealed that the sensory processing patterns were in line with characteristics related to the specified mental illness (Brown & Dunn, 2002).

In summary, there is sufficient evidence to conclude that the AASP is a reliable and valid instrument in providing the desired sensory processing information. Prior to utilising the AASP in the present research, the two words within the AASP were included and two phases of the pilot study implemented to ensure validity of the instrument.

### **3.6. Procedure**

The necessary permission and ethical clearance was obtained from the various UWC structures, as will be discussed under 3.10 Ethical Procedure.

#### **3.6.1. Pilot study**

A pilot study was implemented with a sample of first year students from a different faculty at UWC, namely the Faculty of Science and specifically students from the Pharmacy programme. Students were invited to participate in the pilot study by means of a brief announcement at the start of one of the lectures. During this announcement, ethical considerations were outlined by informing the students that their participation within the pilot study would be voluntary and they received a handout about the intended research (*see Appendix 2*). The researcher considered the fact that the appeal by means of an announcement within the students' lecture period may have to some extent instilled a sense of pressure on the students to participate in the pilot study. Ethical considerations were ensured by informing the students of their rights to not participate and secondly, a separate time and venue was scheduled for the pilot study. It is believed that the pilot sample understood their rights of participation, because the first attempt at administering the questionnaire was unsuccessful in that no students attended the prescribed session for the pilot study to take place. The researcher made a second appeal to the students and optimised participation by displaying the palm-pilots

(or PDA's) as well as having a chocolate as an incentive. Eleven students volunteered to participate.

The pilot study was implemented to test face validity and the appropriateness and reader-friendliness of the questions within the AASP questionnaire. A trial-run in using the palm-pilot equipment was also implemented by gaining student volunteers within the third year of undergraduate students from the Faculty of Community and Health Sciences, to complete the questionnaire on the palm-pilot equipment. Their feedback was considered in relation to the validity of using the questionnaire and palm-pilot equipment. The findings from the pilot study were that the palm-pilots were appropriate to use and that the devices attracted students to partake in the research.

The researcher had originally desired to implement a focus group discussion immediately after administering the AASP questionnaire with the pilot sample. Due to the non-responsiveness of participants with the first attempt of the pilot study, the researcher decided to issue a page with a brief set of questions on specific aspects of the AASP questionnaire for the respondents to provide feedback. The feedback pages indicated that the students understood the questions and resoundingly revealed their enjoyment of using the palm-pilots. The time taken to complete the AASP questionnaire by means of the palm-pilots was in line with the findings of Brown and Dunn (2002), and ranged from 10 to 15 minutes.

### **3.6.2. Use of palm-pilots**

Palm-pilots or Personal Digital Assistants (PDA's) are handheld computers. The palm-pilots were used by the UWC Healthwise Project to collect data from Western Cape high school learners (Caldwell, Smith, Wegner, Vergnani, Mpofo, Flisher, Matthews & Luppino, 2004) and found to be user-friendly and appropriate with those participants. The high school learners are within the middle to late adolescent phase in terms of ages. The use of palm-pilots with first year university students was therefore anticipated as being appropriate.

Another advantageous feature of the palm-pilots is that a safety measure can be used, when loading the specific type of responses required of each of the questionnaire questions. The safety measure displays a notice of an invalid response should the participant key in a non-existent response, like keying in a response of 6 when there is only a 5-point Likert scale of responses stipulated.

The researcher furthermore implemented a secondary trial-run or pilot with a group of students from the FCHS but from the second - and final year of undergraduate studies. This trial-run was purely implemented to establish that the batch of 50 palm pilot devices were in working order.

### **3.6.3. Data collection procedure**

The data, collected by means of the AASP questionnaires, was obtained during October 2008, which was the first three weeks of the final term of the academic year. During this three week data collection period, groups of first year students were accessed daily, with a maximum of two groups being accessed on any particular day.

The academic achievement data, namely the university and matriculation marks, took a longer time to obtain due to the university examinations and university policy whereby the academic marks could not be retrieved until all the academic marks had been entered, vetted and corrected by various structures within the university. The researcher therefore obtained most of the academic marks during November and December 2008, being the end of the academic year. The remaining academic marks were obtained during the first term of the 2009 academic year.

The data collected from the first year students occurred in the following manner. Each participant received a consent form (*see Appendix 3*) to complete prior to receiving their own individual palm-pilot to use for the duration of completing the AASP questionnaire. The participants received a blank white envelope containing

a unique research identity code on the inside. The participants were required to add their student numbers to the slip of paper on the inside of the envelope and thereafter to seal the envelope for confidentiality purposes and to hand it back to the researcher. Participants entered their unique research identity code into the palm-pilot instead of their name, thereby ensuring anonymity.

During the process of updating the electronic data obtained, the researcher was the only person with access to the envelopes that would link the research identity code (number) to the participant's student number. The participant's student number was required in order to obtain the academic marks.

Data entered from the completed questionnaires were managed by means of the researcher extracting the completed questionnaires from the palm-pilot devices after every session of use. The retrieved data was saved on computer in folders labelled according to the date of data collection. The researcher furthermore managed the data separately according to the stratified nine FCHS departments before combining the finalized data into one Excel document. The above measures were systematically put in place to aid in securing the data and to ensure accurate capturing of data.

On completion of the data collection from the participants, the researcher then retrieved the academic marks from two units at UWC, namely the Interdisciplinary Teaching and Learning Unit (ITLU) and Information and Communication Services (ICS).

As previously mentioned, the data to indicate academic achievement was decided as being the academic marks from the first year of university studies as well as from the high school matriculation (grade 12) marks. In the context of the present study the academic achievement was viewed as an indication of the performance in terms of marks achieved by the participants at high school and in their first year of university studies.

Two university modules were selected as follows. The one module was Primary Health Care (PHC) which is offered to FCHS first year students during the beginning phase – the first semester – of the first year of undergraduate studies. The second module was Introduction to Philosophy of Care (IPOC) which is offered during the latter part of the first year, namely the second semester. The two modules were decided upon because these modules form the “core” or foundation information offered to all the first year students from the nine departmental disciplines of the FCHS, therefore all FCHS first year students complete these two modules.

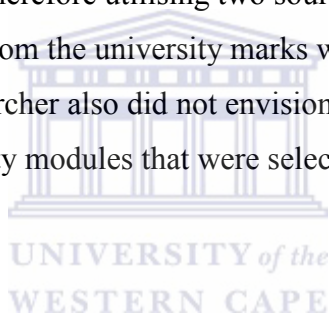
The acquisition of the above-mentioned data not only provided a uniform and set variable across participants for analysis, but also provided an indication of the participants’ performance at the two points, first – and second semester, of the first undergraduate year. The only exception was that the participants from the Department of Human Ecology no longer partook in the PHC module as of 2006. The results chapter will display the omission of the Human Ecology participants regarding PHC only. The commonality of the PHC and IPOC modules amongst the first year FCHS students was the main reason for utilising those marks for analysis within the present study.

The high school matriculation (grade 12) marks were obtained from the participants’ National Senior Certificates. The two high school subjects that were employed for investigation within this research study were English and Mathematics. The researcher established whether English was provided in high school as a first language subject or second language subject and furthermore the grade level as either higher or standard grade. As mentioned within the Literature Review (Chapter Two), language abilities have a strong link to students’ academic performance as well as the fact that English is the primary medium of instruction at UWC (Alexander, 2004). These factors therefore deemed this variable worthy of analysis within the present study.



The second high school subject, Mathematics, was decided as a means to indicate the scientific knowledge background of the first year FCHS students. Besides the actual academic performance of the students in Mathematics in their high school marks, the researcher also noted whether the participants did have Mathematics as a high school subject or not, as Mathematics is not necessarily a requirement for entry in some of the FCHS disciplines. In the cases where the participants did have Mathematics as a high school subject, the researcher noted the level as either higher –, standard – or lower grade. The absence of Mathematics as a high school subject was a variable for analysis related to the academic achievement of students within their first year university studies.

A concept such as academic achievement can be challenging to adequately portray by means of marks and therefore utilising two sources from the matriculation marks and two sources from the university marks was seen as adequate for the present study. The researcher also did not envision a link between the high school subjects and the university modules that were selected.

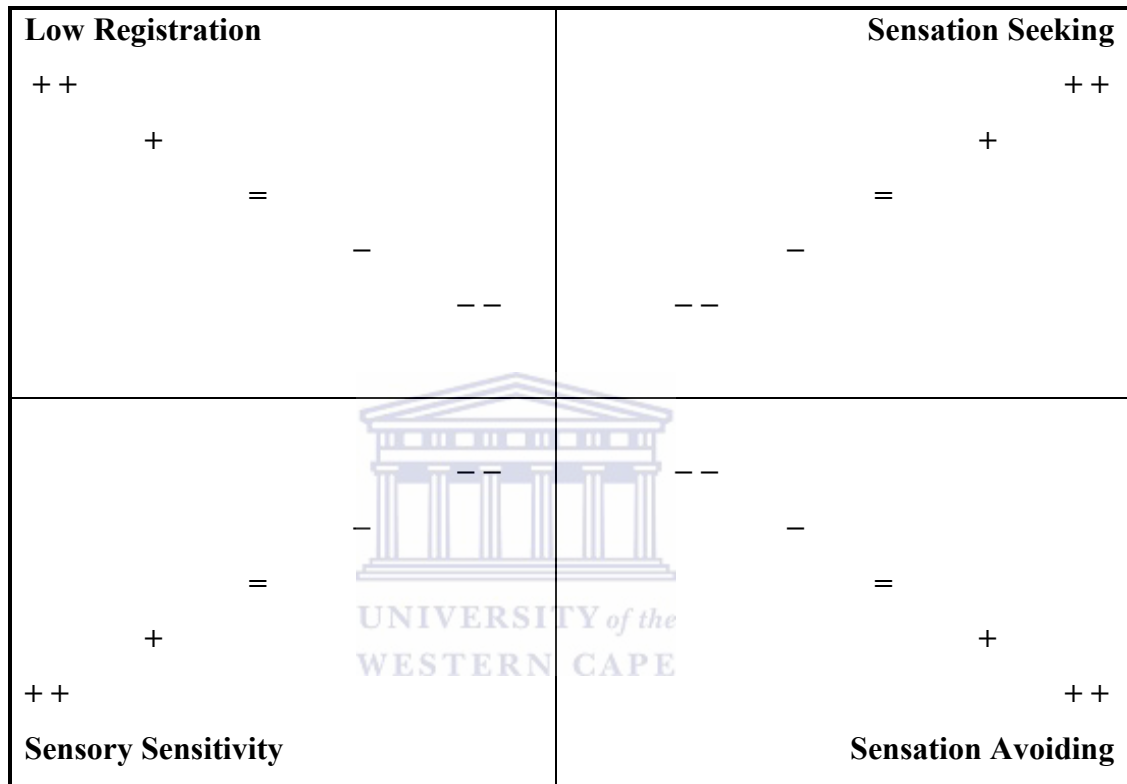


### **3.7. Analysis of Data**

The Statistical Package for Social Sciences (SPSS), version 16.0, was utilised for the statistical analysis of the data. The socio-demographic data, AASP questionnaire data, academic achievement data obtained from the university marks (PHC and IPOC), as well as the matriculation marks (English and Mathematics), were entered for analysis.

The AASP questionnaire yielded data on 60 question items. The 5-point Likert scale for each of the 60 questions was further structured to yield a numerical value out of 75 for each of the four quadrants. The participant's numerical score obtained for each of the four quadrants furthermore represents a specific level description within that particular quadrant. There are five levels within each quadrant that have been utilised for analysis. The five levels of classification were, (1) Much less than most people, (2) Less than most people, (3) Similar to

most people, (4) More than most people, and (5) Much more than most people. There are related symbols in line with the five levels of classifications and these were in the form of positives (+), equal to (=), and negatives (-) and are indicated in the figure 3.1 below. The results of the AASP questionnaire are depicted in a similar figure in Chapter Four.



**Figure 3.1. Quadrant Summary Chart**  
 (Source: Dunn & Brown, 2002, p.29)

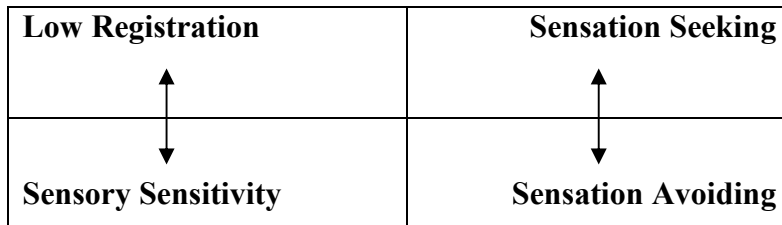
Notes:

- 1. Much less than most people
- 2. Less than most people
- = 3. Similar to most people
- + 4. More than most people
- ++ 5. Much more than most people

Secondary analyses of the AASP data was implemented by means of a ‘collapsing’ and ‘cluster’ method. The collapsing and cluster method of interpreting the AASP scores was devised by Lombard (2007c) to aid in a simplified way of interpreting the score combinations that may seem incompatible. The quadrants related to the neurological continuum can be

collapsed in a particular manner to create the clusters. Similarly the quadrants related to the behavioural continuum can be collapsed for analysis purposes.

Figure 3.2 below indicates the allowed methods of collapsing quadrants.



**Figure 3.2. Collapsing mechanism for Cluster distributions**

(Source: Lombard, 2007c, p.3)

A descriptive analysis was conducted to obtain a profile of the study sample by means of their socio-demographic data of ages, gender, race, course of study as well as SI profile characteristics. The descriptive characteristics are presented in Chapter Four as frequencies, percentages, means and standard deviations.

The bivariate correlations utilised the “shotgun” approach that denotes the calculation of many associations to indicate significant relationships of the inferential statistics (McMillan & Schumacher, 2006). The shotgun approach to analysis was implemented due to the fact that the associations sought between the SI profiles and the other factors of academic achievement had not previously been researched, making this study explorative in nature. Inferential statistics were therefore implemented to determine any associations between the SI profiles, socio-demographic data and academic achievement factors from matriculation marks as well as first year university marks.

The tests implemented for testing associations were chi-square to analyse the categorical data obtained from the four quadrants of the SI profiles. T-tests are used to determine if the scores of two groups differ on a single variable or as in the present study, matched T-tests were used to compare two sets of scores for the same subject (Babbie & Mouton, 2007; *Statistics*, 2010). The scores were the matriculation marks, university marks and SI profile results and the subjects were the first year FCHS students within the sample. T-tests were implemented with

the continuous data referred to above. The significance level was set at 0.05. The inferential statistical analyses that were implemented were in most cases non-parametric, due to the fact that the data was not normally distributed. In the instance of the correlations between the data from the different university mark sources, the Spearman-Brown prediction formula was utilised. In the tests for associations between the matriculation marks, specifically the grade levels for Mathematics and English, associated with the university marks, Kruskal-Wallis tests (Babbie & Mouton, 2007) were used. Similarly, Kruskal-Wallis tests were utilised in testing associations between the socio-demographic variable (age) and the SI profile data. During the tests for associations between the matriculation marks, specifically whether the subject English was as a first or second language, and then associated with the university marks, Mann-Whitney tests (Babbie & Mouton, 2007) were used.



### **3.8. Ethical Procedure**

Permission to conduct the research as well as ethical clearance was first gained from the UWC FCHS Higher Degrees committee. Thereafter the researcher sought and gained permission from the UWC Registrar, the UWC Dean of Research, the FCHS Dean and thereafter each of the FCHS's nine professional programme chairpersons. Appointments were set with the relevant lecturers from the different professional programmes and the researcher then informed the first year students of the research study. The AASP questionnaire was either administered at those times or a separate timeslot was arranged with the participants.

The first year student participants were systematically informed of the nature and intention of the research study, that their participation would be voluntary, and that they had the right to withdraw from the process at any stage of the research project. The participants were also informed, verbally and in writing that their academic results would be obtained for the purposes of this study. The participants' informed consent was then verified by their signatures on consent

forms (*see Appendix 3*). The confidentiality and anonymity of participants were respected throughout the research process by means of measures like research identity codes being used instead of the participants' actual identities.

The participants were informed that the results of the study would be published in an accredited peer reviewed journal. Furthermore, that the findings would be provided to the relevant university structures as the study would be of value to the service-provision of students.



# CHAPTER FOUR

## RESULTS

### 4.1 Introduction

The results of the research will be presented within this chapter. The descriptive statistics are presented first to provide an understanding of the demographics of the study sample. Thereafter, descriptive statistics of the academic achievement variable are presented followed by the tests for associations between the sample and the academic achievement variables. This is followed by the sensory integrative (SI) profiles analyses, then the tests for associations between the SI profiles variables and the socio-demographics, and lastly findings regarding the SI profiles variables and academic achievement.



### 4.2 Demographics of Sample

#### 4.2.1. Professional Programmes

The population for this study was the first year students registered for undergraduate study within the Faculty of Community and Health Sciences (FCHS) for the 2008 academic year (n=593). Table 4.1 below presents the first year student population and sample stratified according to the nine professional programmes of the FCHS. The total number of respondents in the sample equalled 357 first year undergraduate students. The majority of the respondents (n=190) were from the Nursing discipline, which equates 53.2% of the sample. Further details of the sample can be noted within Table 4.1. In most cases the sample is proportionate to the total number of students registered in each of the nine different departments. However, as discussed in Chapter Three, the sample size of 357 is less than the required sample size and therefore the results cannot be considered representative of the study population.

**Table 4.1. Number of students in population and sample, stratified by professional programmes**

Professional Programmes	Population: total	Sample: total
	registered in FCHS	participating in study
	n (%)	n (%)
Dietetics	40 (6.7)	22 (6.2)
Human Ecology	30 (5.1)	12 (3.4)
Natural Medicine	20 (3.4)	12 (3.4)
Nursing	290 (48.9)	190 (53.2)
Occupational Therapy	29 (4.9)	24 (6.7)
Physiotherapy	45 (7.6)	37 (10.4)
Psychology	20 (3.4)	3 (0.8)
Social Work	76 (12.8)	22 (6.2)
Sport, Recreation & Exercise Sciences	43 (7.3)	35 (9.8)
Total	593 (100.0)	357 (100.0)

#### 4.2.2. Gender

The gender representation of the sample was that 277 (77.6%) were female students. The remaining participants (n=80; 22.4%) were male students. The prevalence of more female students within FCHS is due to the predominance of females within the FCHS and within many health professions, such as Nursing and Occupational Therapy (*Faculty of Community and Health Sciences Annual Report, 2008*).

#### 4.2.3. Race

As discussed in previous chapters, UWC attracts an array of students from different racial backgrounds, depicted in Table 4.2. The sample comprised in relation to racial representation, Blacks, Coloureds, Whites, Indians, Asians and respondents who listed themselves as from 'other' race groups.

Most of the students were from the Black race group (n=167; 46.8%), followed by the Coloured race group (n=140; 39.2%), followed by White students (n=30; 8.4%). In the minority were Indian students (n=13; 3.6%) and Asian students (n=5; 1.4%). Lastly, two students (0.6%) classified themselves as from an 'Other' race group. Table 4.2 below represents the race breakdown of the sample according to the professional programme.





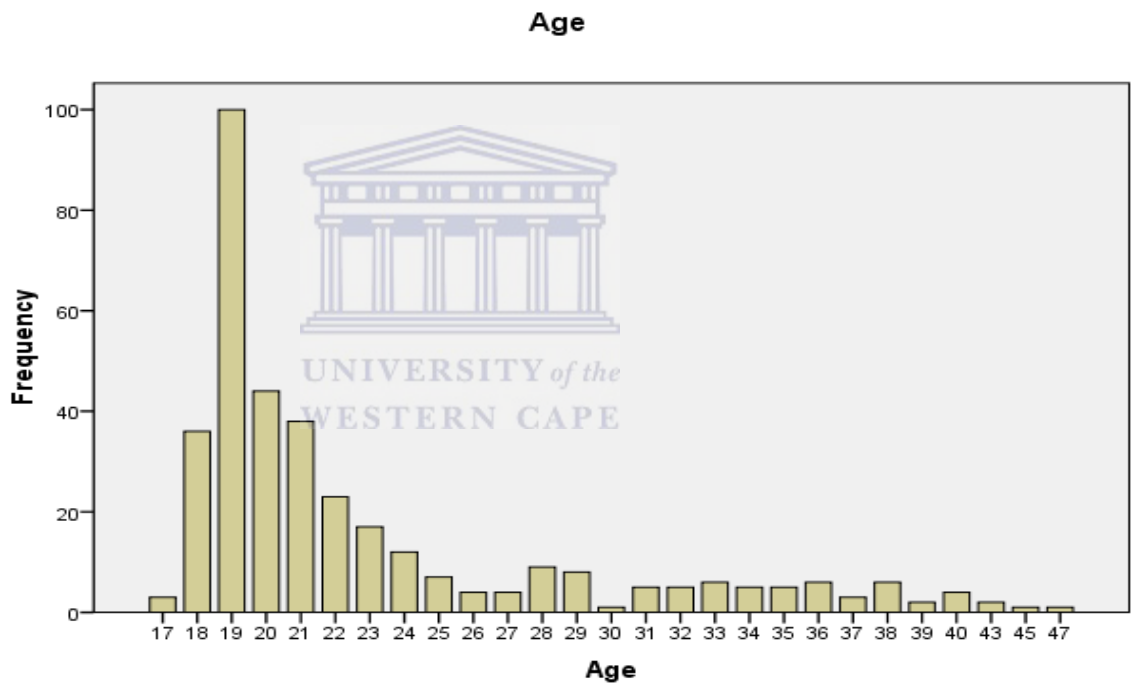
**Table 4.2. Racial breakdown of sample, stratified by professional programmes.**

Professional Programmes	Race						Total n (%)
	Asian n (%)	Black n (%)	Coloured n (%)	Indian n (%)	White n (%)	Other n (%)	
Dietetics	1 (20.0)	6 (3.6)	8 (5.7)	4 (30.8)	3 (10.0)	0 (0)	22 (6.2)
Human Ecology	0 (0)	8 (4.8)	4 (2.9)	0 (0)	0 (0)	0 (0)	12 (3.4)
Natural Medicine	1 (20.0)	1 (0.6)	5 (3.6)	2 (15.4)	3 (10.0)	0 (0)	12 (3.4)
Nursing	2 (40.0)	129 (77.2)	51 (36.4)	0 (0)	6 (20.0)	2 (100.0)	190 (53.2)
Occupational Therapy	0 (0)	4 (2.4)	14 (10.0)	2 (15.4)	4 (13.3)	0 (0)	24 (6.7)
Physiotherapy	0 (0)	3 (1.8)	21 (15.0)	5 (38.5)	8 (26.7)	0 (0)	37 (10.4)
Psychology	0 (0)	0 (0)	2 (1.4)	0 (0)	1 (3.3)	0 (0)	3 (0.8)
Social Work	0 (0)	9 (5.4)	12 (8.6)	0 (0)	1 (3.3)	0 (0)	22 (6.2)
Sport, Recreation & Exercise Sciences	1 (20.0)	7 (4.2)	23 (16.4)	0 (0)	4 (13.3)	0 (0)	35 (9.8)
<b>Total</b>	<b>5 (100.0)</b>	<b>167 (100.0)</b>	<b>140 (100.0)</b>	<b>13 (100.0)</b>	<b>30 (100.0)</b>	<b>2 (100.0)</b>	<b>357 (100.0)</b>

\* The percentages are calculated within vertical columns.

#### 4.2.4. Age

The age range of the sample was 17 years to 47 years. The mean age was noted as being 23 years. It is important to note that most of the respondents were closer to the minimum age value, with 100 (28.0%) students noted as being 19 years old. The majority of the respondents were noted as being between the ages of 17 and 24, equalling a total of 273 (76.5%), which indicates that most of the respondents entered the university soon after completing their high school education. In Figure 4.1 below is a visual presentation of the age ranges of the sample.



**Figure 4.1. Age distribution of sample**

#### 4.2.5. Living arrangements while studying

The demographic section of the questionnaire featured a question to ascertain the living arrangements of the students while they were pursuing their first year of university studies. Most of the respondents indicated that they were residing at their homes while pursuing their university studies (n=215; 60.2%).

A total of 106 (29.7%) students indicated that they were currently residing at the UWC residences, hence living away from home. A group of 33 (9.2%) indicated that they were living at residences within the Western Cape, therefore still residing away from home while studying, but not within the residences on the university grounds. Lastly, a group of 3 (0.8%) indicated that they were residing at residences that were outside of the Western Cape, meaning that they were residing away from home for their university studies, but that this residence was not within the Western Cape where the university complex is situated.

#### **4.2.6. Home classification / background**

Most of the respondents indicated that their homes were within an urban setting (n=277; 77.6%). The remaining respondents indicated their homes were within a rural setting (n=80; 22.4%).

#### **4.2.7. Summary of the demographic information**

In summary, the above demographic information indicated that the study sample consisted of 357 participants in total from the nine professional programmes of the FCHS. There were more females than males within the sample. The participants' ages clustered mainly within the 17-24 year age group, with most of the students being closer to the minimum age value, indicating a "younger" student population. In terms of race, most participants classified themselves as Black. The majority indicated they were residing at home while studying and that their homes were within an urban setting.

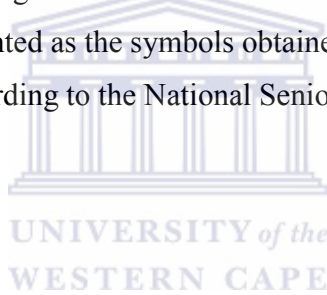
### **4.3. Academic achievement**

The following section presents a description of the sample's academic marks. The matriculation (grade 12) marks will first be presented, followed by the academic marks obtained during the first year of university studies.

### **4.3.1. Matriculation marks (Grade 12)**

The matriculation marks obtained and utilised for the study were for the high school subjects, English and Mathematics. English was selected to provide an indication of the students' linguistic abilities and English is the medium of instruction at UWC. Mathematics was included for analysis as this subject would potentially provide an indication of the scientific knowledge of the students who entered the FCHS. The researcher then also ascertained the percentage of the sample that did not have Mathematics as a high school subject, because Mathematics is not a requirement for entry in some of the FCHS disciplines. The grade levels of the above-mentioned subjects were also noted for investigation purposes.

The academic marks for English and Mathematics are presented in Table 4.3. The academic marks are presented as the symbols obtained, with the related percentage ranges, and these are according to the National Senior Certificate system (*Department of Education, 2001*).



#### **4.3.1.1. English**

Of the results obtained, most of the sample obtained a C-aggregate for English (n=102; 28.6%). This was followed by 98 (27.5%) who had obtained D-aggregates and 82 (23.0%) who received below D-aggregates. As mentioned in Chapter Three, there were difficulties in obtaining the matriculation information therefore the missing information equated 21 (5.9%). Some students within the sample were from countries outside of South Africa and were therefore listed as international students (n=10; 2.8%). The academic marks from the international students were omitted from the inferential statistical analyses. One other student (0.3%) received an age-exemption for entering university. This student was enrolled for the Social Work programme, where it had been stated by a lecturer of that professional programme, that age-exemption cases were common (Glynnis Dykes, personal communication, October 14, 2009). The missing information, international students, and age

exemption student's academic marks were omitted from the inferential statistical analyses (n=32; 9.0%).

Most of the sample had English as a second language subject at high school (n=199; 55.7%). The remaining 126 (35.3%) did English as a first language subject. As most of the sample did English as a second language subject, it was also found that most of them did the subject on the higher grade level (n=317; 88.8%). The remaining 8 (2.2%) performed English on the standard grade level.

#### **4.3.1.2. Mathematics**

The majority of the sample obtained a D-aggregate for Mathematics (n=60; 16.8%). Similar to the previously discussed results for English, the majority of the sample achieved poor academic marks for Mathematics, in that most (n=116; 32.5%) obtained below a D-aggregate. A further 14 (3.9%) listed that they did not have Mathematics as a high school subject.

As mentioned previously, due to the difficulties in obtaining the matriculation information the missing data equated (n=94; 26.3%) of the sample. During inferential statistical analyses, the researcher conducted a secondary analysis whereby the missing data for Mathematics was grouped with the data of students who did not do Mathematics at high school. The researcher considered that the missing data was potentially due to the fact that there was no data to be obtained, as in the viewpoint that the students did not do Mathematics at high school. Similar to what has been discussed above, the international students and age-exemption student were listed as missing data.

The grade level for Mathematics was also considered. Most students had Mathematics on a standard grade level (n=188; 52.7%). The remaining students performed Mathematics on the higher grade level (n=53; 14.8%). It is however important to note that the obtained academic marks were predominantly in the weaker

aggregate categories. Furthermore, there were 8 students (2.2%), who did Mathematics on the lower grade level. Regarding the grade level for Mathematics, there were 108 (30.3%) missing data for this variable.

The students who were affirmed as not having done Mathematics in high school (n=14; 3.9%) were noted as entering the Nursing programme (n=10), three students were enrolled in the Social Work programme and the other student in the Sport, Recreation and Exercise programme. These programmes do not have Mathematics listed as a prerequisite for acceptance into the university programme.

**Table 4.3. Matriculation (grade 12) results**

<b>Symbol obtained</b>	<b>English n (%)</b>	<b>Mathematics n (%)</b>
A (80 – 100%)	7 (2.0)	14 (3.9)
B (70 – 79%)	36 (10.1)	20 (5.6)
C (60 – 69%)	102 (28.6)	39 (10.9)
D (50 – 59%)	98 (27.5)	60 (16.8)
E (40 – 49%)	71 (19.9)	59 (16.5)
F (35 – 39%)	9 (2.5)	36 (10.1)
G (30 – 34%)	0 (0.0)	7 (2.0)
GG (25 - 29%)	2 (0.6)	4 (1.1)
H (0 – 19%)	0 (0.0)	10 (2.8)
International	10 (2.8)	10 (2.8)
Age Exemption	1 (0.3)	1 (0.3)
Missing	21 (5.9)	83 (23.2)
No Maths	Not applicable	14 (3.9)
<b>Total</b>	<b>357 (100.0)</b>	<b>357 (100.0)</b>

#### **4.3.2. University marks**

The two university modules selected were Primary Health Care (PHC) and Introduction to Philosophy of Care (IPOC). PHC was selected as it is offered in the first semester of the first year of studies for all first year FCHS undergraduate students. Unfortunately, the one programme, Human Ecology, no longer offered their students the PHC module, due to a decision that was taken in 2006. The Human Ecology students' PHC marks were therefore listed as missing data. This equated 11 (3.1%) of the 12 Human Ecology students who participated, and the discrepancy could relate to the fact that the other student may have received credits for PHC from doing the module previously or as part of another programme prior to transferring to the Human Ecology programme.

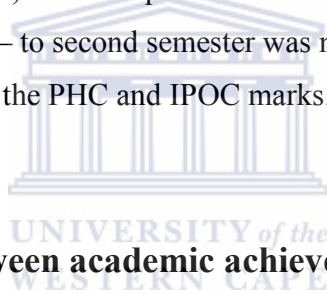
The IPOC module is offered to all first year FCHS students during the second semester of the first year of undergraduate university studies. One student's IPOC marks could not be recovered and this is the only missing data of 0.3% for this variable.

Attendance marks for the IPOC module were also included for inferential statistical analyses with the SI profile data. The researcher included this attendance mark as a variable to ascertain via analyses tests whether attending lectures had any impact on the obtained academic marks and any relationship/association with the SI profile of the students. Two cases (0.6%) of missing marks for Attendance were noted, leaving 355 (99.4%) marks available for analyses purposes. Most of the respondents achieved success for their Attendance marks, namely 342 students (96.3%), with the remaining 13 students (3.7%) receiving low marks (failure) for Attendance. It was noted that the students who failed the Attendance category of their academic marks for IPOC, were from the Sport, Recreation and Exercise Sciences -, Nursing -, Human Ecology -, and Social Work programmes.

The PHC and IPOC marks were decided upon for analyses due to the commonality factor amongst FCHS first year students, but furthermore to provide an indication of the sample's performance at the two phases of the academic year, namely the first – and second semester.

The PHC summative assessment was in the form of a test written by the first year students. The students needed to obtain a mark out of 35. Most of the respondents (n=284; 82.1%) obtained results above 50%, which is the defining point between a pass (success) and failure.

The IPOC summative assessment was also in the form of a test. Most of the respondents (n=313; 87.9%) obtained pass marks. An increase in the performance of the students from the first – to second semester was noted during the inferential analyses by means/way of the PHC and IPOC marks.



#### **4.4. Associations between academic achievement variables**

The results of the inferential statistical analyses are presented below. The following section is structured according to research objective number two that entailed determining the academic achievement of the first year FCHS students through their matriculation (grade 12) marks and their first year university marks.

##### **4.4.1. First year university marks: PHC and IPOC**

In the previous section it has been discussed that the academic achievement variable consisted of high school data as well as the first year university data obtained from the PHC and IPOC test scores. During the correlation analyses between PHC and IPOC, it was found that the data was not normally distributed, therefore non-parametric tests were utilised. In this instance, Spearman correlation was used. A significant positive correlation was noted between the university academic achievement variables for PHC and IPOC. This can be seen where the correlation



coefficient value was 0.327 and the two-tailed significance value was 0.000, set at a significance level of 0.01. A positive correlation indicates a relationship whereby an increase in the one variable corresponds to an increase in the other variable (McMillan & Schumacher, 2006). In relation to the results under discussion, the positive correlation means that as the PHC mark increases in value, so does the IPOC marks.

#### **4.4.2. First year university marks: Attendance and IPOC**

No significant correlations were noted between attendance and IPOC marks ( $p=0.86$ ).

#### **4.4.3. Matriculation marks (Mathematics) and First year university marks**

In determining associations between the level of the high school subject, Mathematics, and the university academic scores for PHC and IPOC, no significant differences were found. The significant values were larger than 0.05, because the correlation for PHC was  $p=0.53$  and for IPOC it was  $p=0.69$ . The results indicated that the marks attained in Mathematics in high school do not have a bearing on the marks attained in PHC and IPOC in the first year of university studies.

#### **4.4.4. Matriculation marks (English) and First year university marks**

A significant positive difference was noted between English and PHC ( $p=0.04$ ). The results therefore indicate that as high school English marks increase, so there was a noted increase in the value of the university PHC marks.

No significant differences were noted between English and IPOC ( $p=0.10$ ), and no significant differences between English and the Attendance data ( $p=0.24$ ). These values are above the significance level of 0.05, therefore are not significant.

The results show that the marks obtained for English in high school did not statistically have a bearing on the marks obtained for IPOC. The results also show that there was no significant association between the mark obtained for English in high school and the mark obtained for attending the IPOC classes at university.

## **4.5. Sensory Integrative profiles**

The scores provide an understanding of the SI profile of the sample of first year students. The total scores obtained from each participant are plotted onto the four quadrant grid related to Dunn's Model (1997) of Sensory Processing (Brown & Dunn, 2002). The four quadrants are as follows, (1) Low Registration, (2) Sensation Seeking, (3) Sensory Sensitivity and (4) Sensation Avoiding. There are also five levels of classification within each of the quadrants. The five levels also have related symbols of positives (+), equal to (=), and negatives (-). This has been depicted in Figure 3.1 in the previous chapter, and the results of the present study, utilising the 'collapsing' and 'cluster' method for secondary analyses, will be plotted in Figure 4.2 to follow.

For the purposes of the present study the obtained scores were captured per each quadrant and utilised as such, for statistical analysis. In line with what Brown & Dunn (2002) state that individuals are complex and these systems merely provide an understanding of performance, the researcher does not presume to make any claims that the following are finalized SI profiles of the sample, but rather the SI 'tendencies' of the first year student sample. Table 4.5 provides the results of the SI profiles according to the classification system.

### **4.5.1. Overview of quadrant results**

Table 4.4 below provides the SI profile tendencies as values or scores, means and standard deviations for the quadrants, obtained from the sample.

**Table 4.4. SI Profile tendency scores**

<b>SI Quadrants</b>	<b>Minimum scores</b>	<b>Maximum scores</b>	<b>Mean</b>	<b>Std. Deviation</b>
Quadrant 1 (Low registration)	17	61	33.96	7.85
Quadrant 2 (Sensation seeking)	26	68	49.25	7.50
Quadrant 3 (Sensory sensitivity)	20	65	40.67	8.70
Quadrant 4 (Sensation avoiding)	21	63	40.32	8.57

Table 4.5 (p.102) below displays the results for the four quadrants, which represents the neurological and behavioural continua of the Sensory Processing Model.

#### **4.5.2. Quadrant 1 (Low Registration)**

The first quadrant represents the neurological continuum according to the Sensory Processing Model. The results showed that of the responses, the highest proportion (n=193, 54.1 %) were within the classification level of “similar to most people”. However, as stipulated by Brown & Dunn (2002), all the responses need to be noted to gain understanding; therefore within each quadrant the five levels of responses were combined to form three levels of responses with the norm remaining stable. The two high levels were combined to form one score and the two low levels were combined to form the other score. For deeper analysis, the collapsing method was implemented in being able to gain understanding of the responses of the four data categories (quadrants). This collapsing method was discussed in Chapter Three in relation to the analyses processes.

Due to this combining of scores, the following was revealed. For quadrant 1, the total of levels four and five combined was 139 (38.9%) as compared to the total of levels one and two which was 25 (7.0%). It is therefore important to note that there is a

significant number of respondents featuring the neurological sensory processing tendencies of Low Registering, depicted in Figure 4.2 (p.104).

The conclusions are therefore that most of the respondents are noted as being “similar to most people” indicating normal responses to sensory input to their neurological systems. The results also indicated that a substantial amount of students reflecting extremes in not registering information.

Having applied the collapsing mechanism to the data obtained within the present study, the findings of quadrant 3 can be seen as the overall indication of the neurological tendencies of the student sample. Quadrant 3, which is the low threshold category of the neurological continuum, will follow below.

#### **4.5.3. Quadrant 2 (Sensation Seeking)**

Table 4.5 indicates the results for quadrant 2, which represent the behavioural continuum of the Sensory Processing Model. The majority of the respondents’ behavioural tendencies of seeking sensory stimulation were “similar to most people” (n=235; 65.8%).

As previously discussed, in gaining an understanding of the numerical scores obtained about SI profiles, all the scores need to be noted. The combining of the extreme positive and negative scores revealed the following. The negative symbols, namely levels one and two, provided a total of 63 (17.6%). The combined total for the higher levels of the Sensory Processing continuum is that of 59 (16.5%).

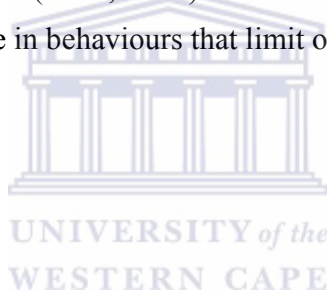
#### **4.5.4. Quadrant 3 (Sensory Sensitivity)**

In Table 4.5 below, the results obtained for quadrant 3, which represents the neurological continuum of the Sensory Processing Model, are displayed. From the data, most of the respondents were within the classification level of “similar to most people” (n=181; 50.7%). In noting the other classification responses obtained from

combining extremes, it can be seen that the higher levels or positives, namely levels four and five, are notable in that the number of respondents totals 165 (46.2%) compared to the lower or negative tendencies (n=11; 3.1%). The secondary analysis therefore revealed that the sample did indicate extremes in sensory sensitivity.

#### **4.5.5. Quadrant 4 (Sensation Avoiding)**

Table 4.5 below (p.102) indicates the results for quadrant 4, which represents the behavioural continuum of the Sensory Processing Model. From the responses, most indicated that their behavioural tendencies of avoiding sensations were “similar to most people” (n=186; 52.1%). The next numerically significant data is that the higher levels, namely levels four and five, displayed totals of (n=157; 44%) compared to the lower level tendencies (n=14; 3.9%). These scores indicate that more respondents tend to engage in behaviours that limit or avoid sensory experiences.

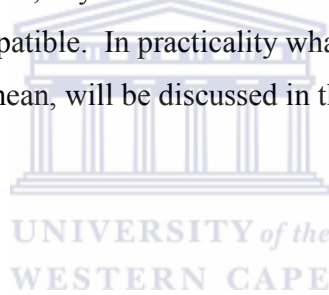


**Table 4.5. SI Profile tendencies of sample**

<b>Symbol</b>	<b>Cut scores classification</b>	<b>Quadrant 1 Low Registration n (%)</b>	<b>Quadrant 2 Sensation Seeking n (%)</b>	<b>Quadrant 3 Sensory Sensitivity n (%)</b>	<b>Quadrant 4 Sensation Avoiding n (%)</b>
--	1. Much less than most people	3 (0.8)	10 (2.8)	0 (0)	0 (0)
-	2. Less than most people	22 (6.2)	53 (14.8)	11 (3.1)	14 (3.9)
=	3. Similar to most people	193 (54.1)	235 (65.8)	181 (50.7)	186 (52.1)
+	4. More than most people	104 (29.1)	43 (12.0)	101 (28.3)	97 (27.2)
++	5. Much more than most people	35 (9.8)	16 (4.5)	64 (17.9)	60 (16.8)
<b>Total</b>		357 (100.0)	357 (100.0)	357 (100.0)	357 (100.0)

#### **4.5.6. Summary of SI Profile descriptions**

A visual representation of the results of the present study related to the students' SI profile tendencies is presented in Figure 4.2 below (p.104). The conclusion that can be made is that the data indicates that most respondents display “similar to most people” sensory processing tendencies from both the neurological - and the behavioural continua. Further important SI profile tendency information, obtained due to the collapsing method implemented for secondary analyses, was that the sample of students displayed low thresholds for both the neurological and behavioural sensory processing continuums. The above-mentioned low threshold tendencies seem to be supplemented by an indication of high thresholds for the neurological continuum (low registration). Brown and Dunn (2002) state that since each quadrant is independent, any combination of scores can be possible, even if patterns seem to be incompatible. In practicality what all of the analyses results about the SI profile tendencies mean, will be discussed in the following chapter.



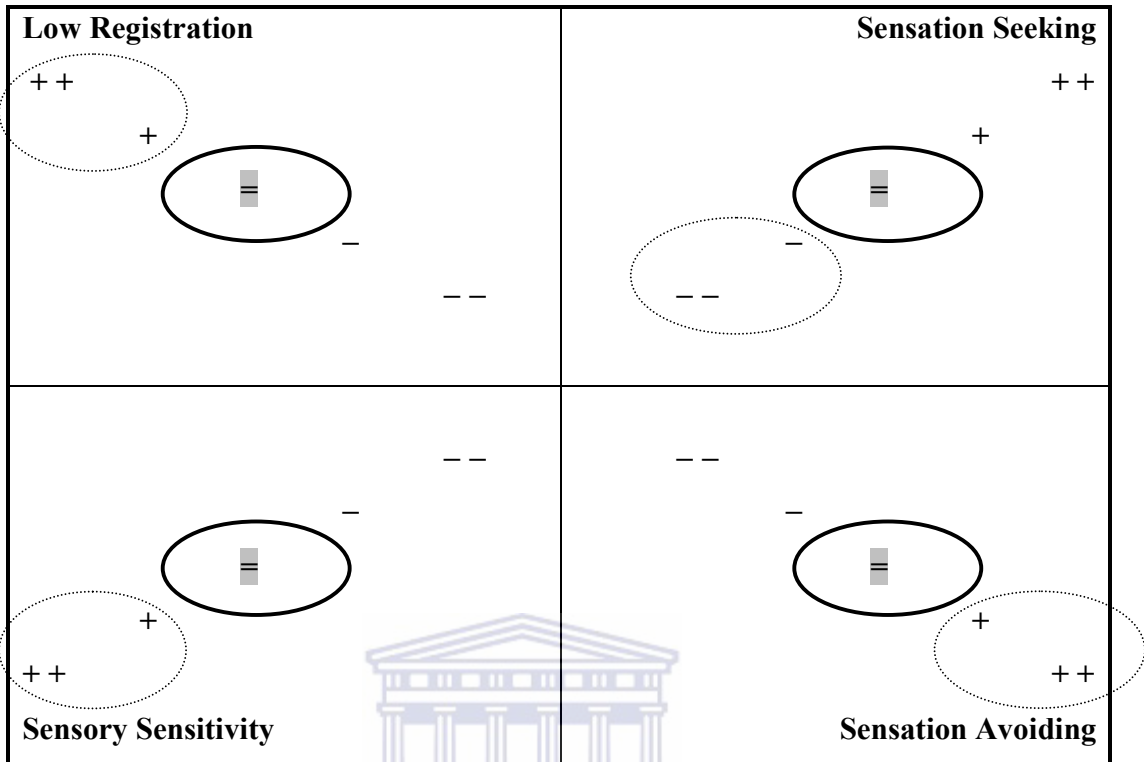


Figure 4.2. Results according to the Quadrant Summary Chart

**Note:**

Tendencies



Majority of respondents ascribed to this classification



Intermediary findings of deeper analysis (collapsing into clusters)

- 1. Much less than most people
- 2. Less than most people
- = 3. Similar to most people
- + 4. More than most people
- ++ 5. Much more than most people



## **4.6. Associations between SI profiles and socio-demographic factors**

The following section is structured according to research objective number three that entailed determining the associations between the SI profiles and the socio-demographic factors of the FCHS students. The socio-demographic variables were the academic programme, gender, race, residence, home environment, and age. Table 4.6 below presents the findings of the associations with all the socio-demographic variables.

### **4.6.1. SI profiles and academic programme**

As previously discussed, the obtained SI profile for each participant would be expressed as four scores for the four quadrants. The analyses tests for associations with the academic programme revealed significant differences for three of the quadrants with the exception of quadrant 2 (Sensation Seeking) that revealed no significant correlations with the academic programme of the participants.

The relationship between the academic programme and SI profile quadrant 1 was statistically significant ( $p=0.015$ ). The relationship between the academic programme and the SI profile quadrant 2 was not significant ( $p=0.125$ ). The relationship between the academic programme and SI profile quadrant 3 was statistically significant ( $p=0.002$ ). The relationship between the academic programme and the final SI quadrant, quadrant 4, was statistically significant ( $p=0.008$ ).

### **4.6.2. SI profiles and gender**

The second socio-demographic variable was gender that was correlated with SI profiles. The p-values for SI quadrant 1 and gender was 0.128. SI quadrant 2 and gender revealed ( $p=0.392$ ). SI quadrant 3 correlated with gender revealed a p-value of 0.217 and SI quadrant 4 and gender revealed ( $p=0.129$ ). Due to the fact that the above p-values are greater than the significance level of 0.05, there was no significant

difference between SI profiles and gender. In other words there was no association between the gender of the participant and the SI profile obtained.

#### **4.6.3. SI profiles and race**

The participants' race classifications were correlated with the SI profiles. The chi-square tests revealed significant differences between race and all of the SI profile quadrants. The results were as follows, SI quadrant 1 ( $p=0.049$ ), SI quadrant 2 ( $p=0.011$ ), SI quadrant 3 ( $p=0.006$ ), and SI quadrant 4 ( $p=0.000$ ). This means that statistically there was evidence of an association between the SI profile of the participant and the race of that participant.

#### **4.6.4. SI profiles and residence**

The socio-demographic variable termed residence, which related to where the students resided while pursuing their university studies, was correlated with the SI profiles. No significant differences were found for the first three quadrants; however a significant difference was noted for SI quadrant 4, the Sensation Avoiding quadrant, as ( $p=0.000$ ).

The p-values obtained for the other three quadrants that did not yield statistical significance are as follows, SI quadrant 1 ( $p=0.434$ ), SI quadrant 2 ( $p=0.723$ ), and SI quadrant 3 ( $p=0.651$ ).

#### **4.6.5. SI profiles and home environment**

Correlation tests were implemented between the home description of being either urban or rural with the SI profiles. The tests revealed a significant association with SI quadrants 1 ( $p=0.043$ ) and SI quadrant 4 ( $p=0.002$ ). No significant differences were found between the home environment and quadrant 2 ( $p=0.138$ ) and quadrant 3 ( $p=0.268$ ).

#### 4.6.6. SI profiles and age

The ages of the participants were correlated with the SI profiles. Significant associations were found between the ages and the quadrants, with the exception of quadrant 3 ( $p=0.138$ ) displaying no significance. The results of the Kruskal-Wallis tests displayed significant associations between the ages and quadrant 1 ( $p=0.008$ ), quadrant 2 ( $p=0.006$ ), and quadrant 4 ( $p=0.033$ ).

**Table 4.6. Results of associations between SI profiles and socio-demographics**

Socio-demographics	SI Profiles			
	Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4
	Low Registration	Sensation Seeking	Sensory Sensitivity	Sensation Avoiding
Academic Programme	<b>0.015</b>	0.125	<b>0.002</b>	<b>0.008</b>
Gender	0.128	0.392	0.217	0.129
Race	<b>0.049</b>	<b>0.011</b>	<b>0.006</b>	<b>0.000</b>
Residence	0.434	0.723	0.651	<b>0.000</b>
Home	<b>0.043</b>	0.138	0.268	<b>0.002</b>
Age	<b>0.008</b>	<b>0.006</b>	0.138	<b>0.033</b>

Note: figures in bold indicate a significant association

#### 4.6.7. Summary

In summary, the correlations between the SI profile scores and the socio-demographics of the participants revealed interesting and new information that had not previously been ascertained. The aspects were only pursued to a certain extent, because a deeper investigation was beyond the scope of the research topic and objectives of this research study.

## **4.7. Relationship between SI profiles and academic achievement**

The final research objective was to determine the relationship between the SI profiles and the academic marks of the first year FCHS students. This research objective directly links to the research aim of this study in determining if there were any relationships between SI and academic achievement.

### **4.7.1. SI profiles and university marks**

#### **4.7.1.1. PHC and SI profiles**

The correlation analyses between the SI profiles and the first semester university marks for PHC revealed no significant correlations. There was however a correlation between PHC and SI quadrant 4, the correlation coefficient was 0.109 and the two-tailed significance value was 0.043. Due to the weakness of the significance, this correlation cannot be considered as significant. In essence this means that the students' SI profile had no relationship with their university marks for the first semester.

As had been previously discussed in the descriptive analyses section, there were many incidences of missing data for Mathematics. The researcher implemented secondary statistical analyses by changing all the missing Mathematics data to indicate that those students had not done Mathematics at high school. The researcher utilised the assumption that the data had been difficult to obtain and originally listed as missing data, but the data could have been missing as there was no data to be obtained due to the students not having done Mathematics at high school. Utilising this adjusted data set in secondary statistical analyses revealed no significant results between PHC and the SI profiles. Once again this signifies that the students' SI profile had no relationship with their first semester university marks.

#### **4.7.1.2. IPOC and SI profiles**

The correlation analyses between the second semester university marks for IPOC and the SI profiles revealed no significant correlations for three of the SI quadrants. The values were IPOC and SI quadrant 2 (correlation coefficient = 0.057 and two-tailed significance value of 0.280). IPOC and SI quadrant 3 (correlation coefficient = -0.063 and two-tailed significance value of 0.234). IPOC and SI quadrant 4 (correlation coefficient = -0.065 and two-tailed significance value of 0.233).

There was a correlation between IPOC and SI quadrant 1, and this was a negative correlation. The correlation coefficient value was  $-0.161$  and the two-tailed significance value was 0.002. A negative relationship is when an increase in the value of the one variable corresponds to a decrease in the value of the other variable (McMillan & Schumacher, 2006). The results therefore display that an increase in the one variable (SI profile) had a noted effect whereby the value of the IPOC mark decreased.

The following can be attributed to the obtained significant relationship. Quadrant 1 is the high threshold level of the neurological continuum within an individual. The higher the SI score for this quadrant would relate to a high degree of filtering out of sensory information. The fact that this SI score correlates negatively with the university IPOC marks can then denote that the student obtained poor IPOC marks. This result would then fit because if a student is neurologically filtering out incoming sensory information, they would be missing valuable learning information and then achieve poor results in the IPOC test.

#### **4.7.1.3. Attendance and SI profiles**

Correlation analyses tests revealed no significant statistical relationships between the Attendance and the SI profiles of students. The obtained values from the two-tailed tests were as follows: Attendance and SI quadrant 1 (correlation coefficient = 0.023 and two-tailed significance value of 0.671), Attendance and SI quadrant 2 (correlation

coefficient = -0.052 and two-tailed significance value of 0.326), Attendance and SI quadrant 3 (correlation coefficient = 0.034 and two-tailed significance value of 0.519) and Attendance and SI quadrant 4 (correlation coefficient = 0.050 and two-tailed significance value of 0.349)

This result then denotes that there could be no association made between the students who diligently attended lectures (or did not attend) and their SI profiles.

#### **4.7.2 SI profiles and matriculation (grade 12) marks**

##### **4.7.2.1. Grade level of Mathematics and SI profiles**

The correlation analyses between the high school subject Mathematics and the SI quadrants revealed the following. The higher –, standard –, and lower grade levels of the subject Mathematics were firstly correlated with the SI profile quadrants. The results revealed no significant correlations with three of the SI profile quadrants: SI quadrant 2 ( $p=0.423$ ), SI quadrant 3 ( $p=0.939$ ), and SI quadrant 4 ( $p=0.255$ ).

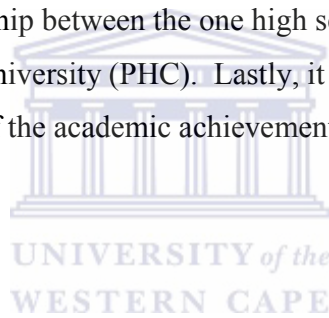
A significant correlation was found between the grade level of Mathematics and the SI quadrant 1 score ( $p=0.025$ ). The above discussion of PHC marks express a similar occurrence to these results. The presence of SI quadrant 1 tendencies that are of filtering out important sensory information could relate to the grade level aptitude and the obtained marks in high school for Mathematics.

##### **4.7.2.2. Mathematics marks and SI profiles**

The analyses between the Mathematics marks and the SI quadrants revealed no significant results. The p-values were as follows, SI quadrant 1 ( $p=0.607$ ), SI quadrant 2 ( $p=0.089$ ), SI quadrant 3 ( $p=0.307$ ), and SI quadrant 4 ( $p=0.101$ ). These results indicate that there seems to be no link between the SI profile and propensity for acquiring and retaining science knowledge.

#### **4.8. Summary of chapter**

The results presented in this chapter regarding determining if there is a relationship between the SI profile and academic achievement of first year FCHS did not provide a resounding yes, with instances of weak significant correlations. There were some incidences however that do display merit. As was also sought out to achieve, a profile of the student sample was obtained in terms of their socio-demographics, SI profiles, and their academic marks pertaining to high school and university. The results of the inferential analyses indicated statistical relationships between certain socio-demographics (academic/professional programme, race, age) and the SI profiles. There were relationships between academic achievement variables such as the first semester and second semester marks of the first year university modules. There was also a relationship between the one high school subject (English) and the first semester module at university (PHC). Lastly, it was found that there were relationships with some of the academic achievement variables and certain of the SI quadrants.



# CHAPTER FIVE

## DISCUSSION

### 5.1 Introduction

The aim of the study was to determine the sensory integrative (SI) profiles of students, and whether there was a relationship between the SI profiles and academic achievement of first year students from the Faculty of the Community and Health Sciences (FCHS) at the University of the Western Cape (UWC).

The discussion that follows will focus on the findings that address the research aim.

### 5.2 Demographics of Sample

The population was first year students in the FCHS and the sample size was not sufficient for the findings to be generalized. Most of the respondents were from the Nursing discipline, the largest programme amongst the nine professional programmes of the FCHS. Most of the participants were Black in terms of race. There were more female participants within this study and this appears to be in line with the demographics of the FCHS (*Faculty of Community and Health Sciences Annual Report, 2008*).

Most of the sample was within the 17-24 year age group. The ages indicate that most of the sample entered the university soon after completing their high school education. This occurrence could be in line with the Y generation literature that accounts for individuals continuing with studies (Maūrtin-Cairncross, 2008).

Most of the sample indicated that they were residing at their homes while pursuing their university studies. The conclusions that could be drawn from them residing at home while studying could be that more students from the local surrounding communities had enrolled at the UWC. Another perspective could be related to the country's economic difficulties as the reason for new first year students enrolling at UWC as the affordable financial option, and furthermore to



save on costs by living at home and travelling to the university campus for lectures.

### **5.2.1 Relationship between socio-demographic variables and SI profiles**

The analyses tests between the socio-demographics and the SI profiles revealed significant relationships for the participants' academic programme, race, the participants' home description in relation to certain SI quadrants, as well as with the sample's ages. There were no significant relationships found between the SI profiles and the socio-demographics of gender and residences, which related to where the students resided while pursuing their university studies. There was only evidence of a significant statistical relationship between the residence and the last SI quadrant (Sensation Avoiding). There were no significant associations between the home environment and the SI quadrant 2 (Sensation Seeking) and SI quadrant 3 (Sensory Sensitivity).

The positive relationships were between the academic programme and three of the SI quadrants, the only exception being with quadrant 2 (Sensation Seeking). These results seem to indicate that individuals with particular SI profiles were enrolled for specific academic programmes. These results are interesting as it could be indicating a preference of professional studies in relation to individuals displaying certain SI profile tendencies. On a deeper level of thought on this matter, the attraction to an academic programme could be subconsciously routed and in this case more related to the sensory processing needs of the individual. Further research on this element would prove interesting and could possibly be beneficial in assisting potential university students to consider academic programmes and courses that are in line with their sensory preferences. Career counselling services could then adopt this SI technique as well as university recruitment initiatives. The adolescent phase of development relates to Erikson's (1963) stage of the "search for identity". Should the career counselling services include the SI profile, this method could assist these students in gaining knowledge about themselves and their sensory preferences and thereby assisting them in gaining a perspective of their identity. The gained perspective could be

expanded upon in allowing the students to gain a better “occupational identity” in relation to their selection of professional course of study. Wilson and Wilcock (2005) found in their study with first year occupational therapy students that when they were introduced to the concept of “occupational balance”, this allowed the students to evoke that concept within their lives from that point onwards and that it assisted them in shaping their occupational identity of becoming a professional occupational therapist. Should the SI profile method be considered by the career counselling services at the universities, this could then possibly assist students to become “self-regulated learners”, and as Cukras (2006) explained, would aid the “under-prepared” students. The gained awareness of their SI profile and thereby their sensory preferences could assist them in making better informed choices about studying that would in turn assist them in being somewhat better prepared for university study. However, all of these are hypothetical and warrant research investigation in light of the fact that the present study found a relationship between the course of study and SI profile. Lombard (2007a) emphasizes the importance of “sensory intelligence” and the benefits. Similarly Herbst and Maree (2008) found that there were benefits on the academic development of individuals who were “emotionally intelligent”.

Significant statistical relationships were obtained between the race of the participants and all four of the SI profile quadrants. These results have not been presented in any previous studies. Deeper investigation on these phenomena would be advised for future research. Although a great degree of research has been done using SI concepts and profiles with diverse groups of children, no focus had been placed on the relationship between race and SI profiles. In those studies that have been conducted, the primary focus was between children with and without disabilities (Daniels & Dunn, 2000; Dunn, 1994; Dunn, 1997; Dunn & Brown, 1997; Ermer & Dunn, 1998). Had race been mentioned within the results of the studies that had been done, the context being international samples are therefore very different to the South African context where the present study transpired. Of the studies done pertaining to SI profiles in adolescents and adults, race had not been the focus either. The focuses of those studies were about

individuals with particular psychiatric conditions and those without (Brown 1999, as cited in Brown, 2001; Brown & Dunn, 2002; Rieke & Anderson, 2009). Once again, the international participant samples are very different to the South African populations. The above discussion merely serves to verify that due to the present study's results of a relationship between race and SI profiles, that this avenue warrants further exploration. Should further research be considered about race and university students, this would be in line with what Alexander (2004) noted about the importance of diversity matters within university settings and the link to bridging the gap of "under-preparedness" to allow for the acquisition of academic success.

Significant relationships were found between age and three of the SI quadrants, with the exception of quadrant 3 (Sensory Sensitivity). There is a gap in literature about the age group of adolescents and their SI profiles. The present study's results of a relationship between ages and SI quadrants with an adolescent and adult sample are therefore new. No studies were found that have been conducted on the SI profiles of university students. International studies such as Rieke and Anderson (2009) who utilised the same instrument, the AASP in research with an adult sample, did not indicate findings of relationships between the ages and SI profiles. Furthermore, the study by Rieke and Anderson (2009) was done with a sample who had obsessive-compulsive disorders and not with university students, as the present study. Kinnealey, Oliver and Wilbarger (1995) similarly conducted research with an adult sample and particularly viewed the sensory defensiveness, however they used a different instrument and the focus was not on the ages and SI profiles. Research employing the focus of the age of adolescents and adults and the SI profiles is therefore encouraged.

There was no relationship found between the gender and the SI profiles of the sample. The socio-demographic item on the home description of the sample related to whether they described their home as urban or rural. The correlation tests between the home description and the SI profiles revealed significant associations with SI quadrants 1 (Low Registration) and quadrant 4 (Sensation

Avoiding). No significant associations were however found between the home environment and quadrants 2 (Sensation Seeking) and quadrant 3 (Sensory Sensitivity).

In conclusion, the research findings have displayed that there are relationships between socio-demographics and SI profiles. These aspects can be considered in future research. Delving deeper into the above findings were beyond the scope of the present research study, therefore future research studies designed primarily around the relationships between any of the socio-demographics described above and SI profiles is advised. The future studies would also be further motivated by the fact that a South African population carry many other attributes due of the rich variety of ethnicity and race. The prospects of further research on socio-demographics and SI profiles are many, as the adolescent and adult age groups could continue to be the focus, as in the present study. The setting could similarly be the university or beyond.



### **5.3. Academic achievement of first year CHS students**

The academic achievement variables were of the matriculation (grade 12) marks as well as the first year university marks. The results revealed that most of the sample obtained poor marks for grade 12 in high school. The grade 12 variables of the subjects English and Mathematics revealed C-aggregates and weaker. Most of the sample had English as a second language subject and this furthermore provides an overall indication that the students who entered the FCHS did not have a good command of the English language, which would also have an impact on their university studies as the medium of instruction at UWC is English.

There was a percentage of the sample that did not have Mathematics as a high school subject, because some of the FCHS programmes do not have Mathematics as a prerequisite for acceptance. Of the participants who did have Mathematics in high school, most of them did the subject on a standard grade level and there were some who even did it on a lower grade level. The academic marks obtained were

D-aggregates, thereby depicting poor academic achievement. Mathematics had been included to denote the science grasp of the students. The results therefore indicate that most of the sample entered the university with a poor scientific background.

The two university modules selected were Primary Health Care (PHC) and Introduction to Philosophy of Care (IPOC) due to the commonality amongst the FCHS first year students. PHC depicted the first semester of the academic year and IPOC the second semester.

The analyses indicated that there was an increase in the performance of the students from the first – to second semester. This tendency could be related to the increased academic maturity and learning that had taken place following the first semester module and that the students utilised the attained knowledge during the latter part of the academic year and therefore displayed the increased academic performance. Huysamen (2000) revealed the increase in academic performance of university students from their first – to their final year of undergraduate studies. He attributed the increase in academic performance to the “late blooming” hypothesis and furthermore found that the first year of university studies were better predictors of academic success than matriculation marks. The findings of the present study of the increased academic achievement in the first year of university studies as compared to the poor matriculation (grade 12) marks are therefore in line with Huysamen’s (2000) findings.

Although there was a positive association revealed between the high school subject, English, and the first year university module, PHC, there was no association between the same high school subject and the second semester module, IPOC. These results are therefore inconclusive in being able to verify that high school academic marks have a bearing on academic performance in university.

### **5.3.1 Relationship between academic achievement variables and SI profiles**

The correlation analyses between the university marks and the SI profiles revealed no significant correlations. There were incidences of statistical relationships with one of the SI quadrants, but due to the weakness of the significance levels, the considered tendency would be of no relationship between the SI profiles and the university marks for the first semester.

There was a negative statistical correlation obtained between the second semester module, IPOC, and SI quadrant 1 (Low Registration). The correlation coefficient value was  $-0.161$  and the two-tailed significance value was  $0.002$ . A negative relationship is when an increase in the value of the one variable corresponds to a decrease in the value of the other variable (McMillan & Schumacher, 2006). The results therefore displayed that an increase in the one variable (SI profile) had a noted effect whereby the value of the IPOC mark decreased. The following can be attributed to this obtained significant relationship. Quadrant 1 is the high threshold level of the neurological continuum within an individual. The higher the SI score for this quadrant relates to a high degree of filtering out of sensory information. The fact that this SI score correlates negatively with the university IPOC marks can then denote that the student obtained poor IPOC marks. This result would then fit because if a student is neurologically filtering out incoming sensory information, they would be missing valuable learning information and then achieve poor results in the IPOC test. Although this is a weak correlation, this finding is interesting because it allows one to interpret the impact and interrelationship between the SI quadrant characteristics of an individual and the possible outcome in terms of learning and academic achievement.

### **5.4. Sensory Integrative profiles of first year CHS students**

The results indicated that on each of the four SI quadrants, the sample displayed the classification level of “similar to most people”. These findings indicate that according to SI quadrant 1 (Low Registration) and SI quadrant 3 (Sensory Sensitivity) the sample easily received incoming sensory input from the

environment. The results indicate that according to the SI quadrant 2 (Sensation Seeking), the sample displayed “similar to most people” the behavioural tendency of seeking sensory stimuli. According to the results for SI quadrant 4 (Sensation Avoiding), the participants displayed “similar to most people” in their behavioural tendencies of avoiding sensory stimuli.

Secondary analyses on the data were implemented utilising the combining of scores within each quadrant, to indicate extremes. The findings revealed that extremes were obtained for SI quadrants 1 (Low Registration) and quadrant 3 (Sensory Sensitivity). Being “low registrators” indicate that an individual has a high neurological threshold for incoming sensory input and this can be characterised by individuals who appear slow to respond and miss cues readily (Brown & Dunn, 2002). SI quadrant 3 (Sensory Sensitivity) is the opposite continuum of the neurological spectrum and due to the fact that extremes were obtained from the sample would then indicate that the individuals were also “sensory sensitives”. One would view these findings as incompatible, because the indication is that the participants have both high thresholds and low thresholds for their neurological systems. Brown and Dunn (2002) affirmed that any combination of scores could be possible and that one would then need to interpret the findings by viewing the four quadrants in totality to derive conclusions regarding the individual’s sensory processing patterns. In viewing the findings from the four quadrants in totality and implementing the collapsing mechanism to the data, it could be concluded that the participants have low thresholds regarding their neurological systems. The findings of high thresholds also for the neurological systems can be seen as the brain and nervous system’s manner of achieving homeostasis (internal balance). Lombard (2007a) described the high thresholds for the neurological system in relation to a SI profile of low thresholds as the body’s coping mechanism.

The first year university student sample therefore have low thresholds for their neurological systems and can be termed “sensory sensitives”. The characteristics of having this SI profile are that sensory input enters their neurological systems

easily, they readily notice or are aware of the sensory features of the environment and as such can be distractible (Brown & Dunn, 2002).

In practicality what this means is that information is entering the students' neurological systems at a steady rate and can therefore be seen as easy assimilation of information. The negative aspect of this neurological system is that if too much information and at too frequent a rate is taking place, the filtering out of information by the brain and nervous system would occur. This may then seem as though the student had not paid attention or grasped the concepts provided within lectures and tutorials. The strategies that could be implemented to optimize learning would be for the lecturing staff and tutors to provide a variety of sensory information when facilitating learning of new information. The facilitation of information should however be clear and structured to allow for the correct information to reach the students' nervous systems. To disallow the filtering out of information, excessive amounts of teaching need not take place. This will allow for the appropriate balance of teaching and learning opportunities to take place in line with the students' neurological system needs. The provision of a variety of sensory information being provided to optimize learning is in line with the recommendations for working with the Y generation individuals, as expressed by Maūrtin-Cairncross (2008). The suggestions about the learning process can be attributed to the body of literature about learning theories that define the importance of the environment in aiding learning, as discussed by Skinner (1976). Piaget (1952) indicated the role of the intrinsic motivation for individuals' learning. In line with the findings of the present research that provides an indication of the internal workings of the sample, by means of their neurological system, this allows us to note that the "sensory sensitive" student sample have an internal drive for assimilating knowledge, which Piaget (1952) indicated as being highly important. The learning process also links to Vygotsky's (1962) teachings of the individuals' ability to learn through interaction and experience being facilitated by a senior (lecturer, mentor, and tutor). The brain-based learning theories impel the harmony between the internal workings of the individual and the outer states surrounding said individual (Case-



Smith, 2001; Jensen, 2000). The balance between the internal states and outer states of the individuals will promote learning and this is the reason for the above discussion about the facilitation of sensory learning opportunities in line with the SI profile of students. The learning styles literature that had been reviewed could then be considered by the UWC Centre for Student Support Services as encouraging learning styles in line with the SI profile. All of these options could then be researched. Lastly, the consideration of implementing the SI profile at university is in line with Positive Psychology, which promotes the shift of focus from a deficits model. The use of inventories such as the AASP at a university setting is not meant to exclude individuals but rather to assist them. The students, who are primarily coming from the schools system within the Western Cape, would be accustomed to the manner of support by means of the Circle of Courage policies (*Western Cape Education Department, 2007*). This would imply similarities of support offered by the primary and high school systems and with that offered by the university setting.

The sample obtained “similar to most people” responses to sensory stimuli regarding their behavioural systems. The secondary analyses that were implemented indicated that the sample displayed “sensory avoidant” characteristics in line with the results of the extreme scores for SI quadrant 4 (Sensation Avoiding). This shows that the sample has low thresholds for their behavioural response continuum and the associated characteristics are that individuals would engage in behaviours that limit sensory stimuli. These individuals can be seen as doing well with consistency and routine (Brown & Dunn, 2002). In relation to these findings, the sample displayed low tendencies of seeking out sensory opportunities in SI quadrant 2 (Sensation Seeking). In essence what this means is that the sample engage in limiting of sensory experiences more than they would opt for extreme sensory experiences. In terms of the teaching and learning process at university, the preceding discussion of the students being exposed to an adequate amount of sensory input and within well structured parameters would thereby align with their behavioural thresholds. A practical suggestion would be that although different sensory methods should be

implemented to optimise their learning, the sequence should be fairly consistent. Examples of these could be seen as the lecturer having relevant definitions related to the topic to be covered within the lecture and providing these using different sensory cues such as verbally (auditory cues), followed by perhaps pictures of the topic being covered via videos or audiovisual equipment (visual cues). There could also then be practical exposure to the topic being covered, thereby providing the movement and kinaesthetic sensory cues. In maintaining the structure, a similar routine could be implemented within each lecture when covering new topics. These suggestions would be more in line with Vygotsky's (1962) theories whereby the lecturer is the individual within the environment offering the guidance and facilitation of learning through different experiences. Due to the interest in teaching and learning matters as indicated by the vast body of literature on this topic, should any of the above sensory mechanisms for teaching and learning be implemented, this could be researched further.

## **5.5. Limitations**

There were several limitations in this study. Firstly, the sample size was not sufficient for the findings to be generalised to the population, and they came from one faculty.

Secondly, the academic marks utilised, namely PHC and IPOC, can be seen as not a pure reflection of the students' capabilities, because the finalized marks were obtained after re-evaluation opportunities were given. Due to the mark amendments, the final reflection of the throughput rate may have been skewed, where the failure rate appeared less than had the first opportunity academic marks been used for analysis.

There were challenges in obtaining the matriculation information of the respondents and this led to data that was listed as missing. In those cases the data was omitted from the statistical analyses.

Lastly, a concept such as academic achievement is challenging to portray by means of academic marks. Although four sets of academic marks were utilised for the study, more marks could have been utilised in an attempt at a more

comprehensive view. Attempts can be made at aligning the matriculation subjects and the university modules.

## **5.6. Summary of chapter**

The findings of this research study revealed the SI profile tendencies of the first year student sample. According to the four quadrants of Dunn's (1997) Model of Sensory Processing the sample performed "similar to most people" on each of the quadrants. The secondary analyses where levels of responses were clustered and all four quadrants were viewed in totality revealed that the sample had low thresholds on the neurological and behavioural continua. The findings also revealed a possible coping mechanism of the nervous system of filtering out excess sensory information. Although there was no firm statistical relationship found between the SI profiles and academic achievement, interesting findings amongst the different variables were obtained. The key findings were the relationships between the socio-demographics and SI profiles that had not been published in previous literature.

UNIVERSITY of the  
WESTERN CAPE

# **CHAPTER SIX**

## **RECOMMENDATIONS AND CONCLUSION**

### **6.1. Summary of the research study**

The aim of the research study was to obtain the SI profiles of students, and to determine whether there was a relationship between the SI profiles and academic achievement of first year students from FCHS at the UWC. No firm significant relationship was found between the SI profiles and academic achievement of the sample. The obtained SI profiles of the students were that of “similar to most people” or what could be stated as normal sensory processing abilities related to Dunn’s (1997) Model of Sensory Processing. Secondary analyses utilising a cluster and collapsing method indicated that the SI profiles of students were that of having low thresholds on the neurological continuum as well as low thresholds on the behavioural continuum. Other results of interest were brought out by means of the present research. Statistical relationships were found between the socio-demographics of ages, race and academic courses of study. Relationships between the academic achievement factors were also detected, namely a positive relationship between the first and second semester university modules. The concept of SI profiles had not previously been established with a South African university population and the results of the present study have illuminated a variety of avenues that could be taken further in research.

### **6.2. Recommendations**

#### **6.2.1. Recommendations regarding future research**

Although a statistical relationship was not achieved between the students’ SI profiles and academic achievement, there were other findings obtained that warrant further investigation.

A key recommendation is that a study about academic achievement should encompass a greater propensity of academic marks in order to derive findings that could be more definitive and conclusive. Similarly, a larger sample would allow

for the findings to be generalized to the population. A study about academic achievement could encompass more factors pertaining to learning, perhaps learning styles or thinking styles.

The present research displayed relationships between the socio-demographics and SI profiles. These aspects can be considered in future research, where socio-demographics and SI profiles could be the main focus of investigation.

The discussion about the SI profiles and the impact on learning could be the focus of a future study with more of an experimental research design. If the SI profiles of the participants were established, the participants could then be exposed to particular teaching and learning opportunities to investigate the impact thereof.

### **6.2.2. Recommendations for teaching and learning**

There are various structures within the university environment that focus on matters of teaching and learning, such as the teaching and learning centres, academic development units and university writing centres. The findings of the present study could be considered by the teaching and learning centres. These centres could then offer the new – and existing academic lecturing and tutoring staff information on the SI profiles of university students and suggestions on how to teach to facilitate learning.

### **6.2.3. Recommendations for student support**

The UWC Centre for Student Support Services could consider offering SI profiling as a service to students. An occupational therapist would ideally be able to perform SI profile assessments. Study skills that are in line with the obtained SI profiles could then be suggested.

### **6.3. Conclusion**

Prior to the present study no SI profiles of first year university students in a South African setting had been recorded. Although no relationship could be established between the SI profiles and academic achievement of the first year Health Sciences students at UWC, the SI profiles were obtained. Statistical relationships were obtained between the SI profiles and certain socio-demographic factors, namely age, race and course of study. This research therefore revealed findings that had not previously been found, and with it displayed the value of occupational therapy tools and theories in a university setting, and that could be taken further in future research studies.



## REFERENCES

- Academic Development Centre University of the Western Cape. (1997). AD Issues, 5(1), 1 - 90.*
- Alexander, P.M. (2004). Diversity at a dual-medium university: factors affecting first -year students' attitudes. *South African Journal of Higher Education, 18(1), 202 - 220.*
- Anderson, E., & Emmons, P. (1996). *Unlocking the Mysteries of Sensory Dysfunction*. Arlington: Future Horizons Inc.
- Antonius, R. (2003). *Interpreting Quantitative Data with SPSS*. London: Sage Publications.
- Aronson, J. (Ed.). (2002). *Improving Academic Achievement: Impact of psychological factors on education*. USA: Elsevier Science.
- Asher, A.V., Parham, L.D., & Knox, S. (2008). Interrater reliability of Sensory Integration and Praxis Tests (SIPT) score interpretation. *American Journal of Occupational Therapy, 62 (3), 308-19.*
- Ayers, A. J. (1979). *Sensory integration and the child*. Los Angeles: Western Psychological Services.
- Babbie, E., & Mouton, J. (2007). *The practice of social research*. South Africa: Oxford University Press Southern Africa Ltd.
- Baranek, G.T. (1999). *Sensory Processing Assessment for Young Children (SPA)*. Unpublished manuscript, University of North Carolina.

Baranek, G.T., David, F.J., Poe, M.D., Stone, W.L., & Watson, L.R. (2006). The Sensory Experiences Questionnaire: Discriminating sensory features in young children with autism, developmental delays, and typical development. *Journal of Child Psychology and Psychiatry*, 47(6), 591 - 601.

Baren, M. (2000). "Is sensory integration dysfunction for real?". *Contemporary Pediatrics* 17(5). Retrieved March 28, 2006 from <http://find.galegroup.com/ips/infomark.do?&contentSet=IAC.28/03/2006>  
Thomson Gale Document Number: A62988542

Barends, M.S. (2004). *Overcoming adversity: an investigation of the role of resilience constructs in the relationship between socio-economic and academic factors and academic coping*. Unpublished Master's Thesis. Cape Town: University of the Western Cape.

Bayne, R. (1997). *The Myers-Briggs Type Indicator: A critical review and practical guide*. London: Stanley Thornes Publishers Ltd.

Brendtro, L.K., Brokenleg, M., & Van Bockern, S. (2002). *Reclaiming youth at risk: our hope for the future*. Indiana: Solution Tree Press.

Brendtro, L.K., Brokenleg, M., & Van Bockern, S. (2002). The circle of courage and positive psychology. *Reclaiming children and youth*, Retrieved May 28, 2010, from [www.reclaiming.com](http://www.reclaiming.com).

Brown, C. (2001). What is the best environment for me?. A sensory processing perspective. *Recovery and wellness: models of hope and empowerment for people with mental illness*, 115 - 125.

Brown, C., & Dunn, W. (2002). *Adolescent /Adult Sensory Profile User's Manual*. USA: Therapy Skills Builders.



Brown, C., Tollefson, N., Dunn, W. Cromwell, R., & Fillion, D. (2001) .The adult sensory profile: measuring patterns of sensory processing. *American Journal of Occupational Therapy*, 55(1), 75 - 82.

Caldwell, L., Smith, E., Wegner, L., Vergnani, T., Mpofu, E., Flisher, A.J., Mathews, C., Luppino, C. (2004). HealthWise South Africa: Development of a Life Skills Curriculum for Young Adults. *World Leisure Journal*, 46(3), 4 - 17.

Case-Smith, J. (1997). Variables in successful occupational therapy practice in schools. *Occupational Therapy Journal of Research*, 17, 133 – 153.

Case-Smith, J. (2001). *Occupational therapy for children* (4th ed.). USA: Mosby Inc.

Case-Smith, J., Butcher, L., & Reed, D. (1998). Parents' Report of Sensory Responsiveness and Temperament in Preterm Infants. *American Journal of Occupational Therapy*, 52(7), 547 - 555.

Chess, S., & Thomas, A. (1998). *The New York longitudinal scales adult temperament questionnaire test manual*. Scottsdale, AZ: Behavioural Developmental Initiatives.

Clark, F., Mailloux, Z., Parham, L.D., & Primeau, L.A. (1991). Statement: occupational therapy provision for children with learning disabilities and/or mild to moderate perceptual and motor deficits. *American Journal of Occupational Therapy*, 45 (12), 1069-74.

Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004). *Learning styles and pedagogy in post-16 learning: A systematic and critical review*. London: Learning and Skills Research Centre (LSRC).

Cukras, G.G. (2006). The investigation of study strategies that maximize learning for underprepared students. *College Teaching*, 54(1), 194 -197.

Daniels, D. B., & Dunn, W. W. (2000). Development of the Infant-Toddler Sensory Profile. *Occupational Therapy Journal of Research*, 20, 86 - 90.

Deary, I.J. (1994). Sensory discrimination and intelligence: Postmortem or resurrection?. *American Journal of Psychology*, 107, 95 – 115.

Deary, I.J., Bell, P.J., Bell, A.J., Campbell, M.L., & Fazal, N.D. (2004). Sensory discrimination and intelligence: Testing Spearman's other hypothesis. *American Journal of Psychology*, 117, 1 – 18.

Denney, A. (1997). Quiet music: An intervention for mealtime agitation?. *Journal of Gerontological Nursing*, 23(7), 16 - 23.

Department of Education. (2001). Revised National Curriculum Statement Grades R-9. Retrieved November 6, 2010, from <http://education.pwv.gov.za>

Dickie, V.A., Baranek, G.T., Schultz, B.S., Watson, L.R., & McComish, C.S. (2009). Parents' reports of sensory experiences of preschool children with and without autism: a qualitative study. *American Journal of Occupational Therapy*, 63(2), 172 - 181.

Duncan, E.A.S. (Ed.). (2009). *Skills for practice in occupational therapy*. UK: Churchill-Livingstone Elsevier Ltd.

Dunn, W. (1994). Performance of typical children on the Sensory Profile: An item analysis. *American Journal of Occupational Therapy*, (48)11, 967 - 974.

Dunn, W. (1997). The impact of sensory processing abilities on the daily lives of young children and their families: A conceptual model. *Infants and Young Children, 9*(4), 23 - 35.

Dunn, W. (1999). *Sensory Profile*. San Antonio: The Psychological Corporation.

Dunn, W.W. (2000). Habit: what's the brain got to do with it?. *Occupational Therapy Journal of Research, 20*, 6 - 20.

Dunn, W. (2001). The Sensations of Everyday Life: Empirical, Theoretical, and Pragmatic Considerations. *The American Journal of Occupational Therapy, 55*(6), 608 – 620.

Dunn, W. (2006). Our senses tell an important story. Retrieved June 23, 2006, from [http://www.scopevic.org.au/therapy\\_profdev\\_winniedunn\\_wmcg.html](http://www.scopevic.org.au/therapy_profdev_winniedunn_wmcg.html).

Dunn, W. (2009). Invited commentary on “Sensory sensitivities of gifted children”. *American Journal of Occupational Therapy, 64*(3), 296 – 300.

Dunn, W., & Bennett, D. (2002). Patterns of Sensory Processing in children with Attention Deficit Hyperactivity Disorder. *The Occupational Therapy Journal of Research, 22*(1), 4 - 15.

Dunn, W., & Brown, C. (1997). Factor analysis on the sensory profile from a national sample of children without disabilities. *American Journal of Occupational Therapy, 51*(7), 490 - 499.

Dunn, W., & Westman, K. (1997). The Sensory Profile: The performance of a national sample of children without disabilities. *American Journal of Occupational Therapy, 51*(1), 25 - 34.

Dykes, G. (2009). Personal communication Oct 14, 2009. Available at [gdykes@uwc.ac.za](mailto:gdykes@uwc.ac.za).

Eiselen, R., & Geysers, H. (2003). Factors distinguishing between achievers and at risk students: a qualitative and quantitative synthesis. *South African Journal of Higher Education*, 17(2), 118 - 130.

Emmons, P.G., & Anderson, L.M. (2005). *Understanding sensory dysfunction: learning, development and sensory dysfunction in autism spectrum disorders, ADHD, learning disabilities and bipolar disorder*. UK: Jessica Kingsley Publishers.

Erikson, E.H. (1963). *Youth: change and challenge*. New York: Basic Books Publishing.

Ermer, J., & Dunn, W. (1998). The Sensory Profile: a discriminant analysis of children with and without disabilities. *American Journal of Occupational Therapy*, 52(4), 283 - 290.

*Faculty of Community and Health Sciences Annual Report 2008*. (2008). Available at [www.uwc.ac.za](http://www.uwc.ac.za).

Fatt, J.P.T., & Joo, N.T. (2001). Learning styles: Implications for Design and Technology Education. *Management Research News*, 24(5), 24 - 37.

Faure, M., & Richardson, A. (2002). *Baby Sense: Understanding your baby's sensory world-the key to a contented child*. South Africa: Metz Press.

Ferreira, J.G. (1995). Transition from school to university. *South African Journal of Higher Education*, 9(1), 154-158.

Fisher, A.G, Murray, E.A., & Bundy, A.C. (1991). *Sensory Integration Theory and Practice*. USA: F.A.Davis Company.

Garnezy, N. (1985). Stress resistant children: The search for protective factors. In Stevenson, J. (Ed.) *Recent Research in Developmental Psychology, Journal of Child Psychology and Psychiatry*. Book Supplement No.4.

Gere, D.R., Capps, S.C., Mitchell, D.W., & Grubbs, E. (2009). Sensory sensitivities of gifted children. *American Journal of Occupational Therapy*, 64(3), 288 – 295.

Greenspan, S.I. (2004). Working with the child who has Sensory Integration Disorder. *Scholastic Early Childhood Today*, 18(7), 20 - 21.

Hawkins, J.M. (Ed.). (1990). *The Oxford Dictionary* (2nd ed.). Oxford: Oxford University Press.

Heller, S. (2002). *Too loud, too bright, too fast, too tight*. USA: Harper Collins Publishers.

Herbst, T.H., & Maree, K.G. (2008). Thinking style preference, emotional intelligence and leadership effectiveness. *South African Journal of Industrial Psychology*, 34(1), 32 - 41.

Honey, P. & Mumford, A. (2000). *The learning styles helper's guide*. Maidenhead: Peter Honey Publications Ltd.

Hopkins, W.G. (2000). *Quantitative research design*. Retrieved January 14, 2002, from <http://www.sportsci.org/jour/0001/wghdesign.html>

Huysamen, G. K. (1999a). Psychometric explanations for the poor predictability of the tertiary academic performance of educationally disadvantaged students. *South African Journal of Higher Education*, 13(1), 132 - 138.

Huysamen, G. K. (1999b). Demographic-group differences in the prediction of tertiary-academic performance. *South African Journal of Higher Education*, 13(1), 171 - 177.

Huysamen, G. K. (2000). The differential validity of matriculation and university performance as predictors of post-first-year performance. *South African Journal of Higher Education*, 14(1), 146 - 151.

Huysamen, G. K. (2001). Marking standards and the differential predictability of the first-year university performance of different demographic groups. *South African Journal of Higher Education*, 15(1), 129 - 137.

Israel, G.D. (1992). *Determining sample size*. University of Florida. Retrieved June 5, 2008, from <http://edis.ifas.ufl.edu/PD006>

Jensen, E. (2000). *Brain-based learning: the new science of teaching & training*. (Revised Ed.). USA: The Brain Store.

Johnson-Ecker, C.L. & Parham, L.D. (2000). The evaluation of sensory processing: a validity study using contrasting groups. *American Journal of Occupational Therapy*, 54 (50), 494-503.

Jung, C. (1977). *Psychological Types*. In Hull, R.F.C. (Eds.), *Collected works of C.G. Jung* (pp.12-13, 28, 68). Princeton University Press.

Kientz, M.A., & Dunn, W. (1997). A comparison of the performance of children with and without Autism on the Sensory Profile. *American Journal of Occupational Therapy*, 51(7), 530 - 537.

Kinnealey, M., Oliver, B., & Wilbarger, P. (1995). A phenomenological study of sensory defensiveness in adults. *American Journal of Occupational Therapy*, 49(5), 444 - 451.

Kluger, J. (2002). Too loud, too bright, too fast: this hectic life: a new syndrome. (*Health*). *Time* 160(22). Retrieved on March 28, 2006 from <http://find.galegroup.com/ips/infomark.do?&contentSet=IAC>. Thomson Gale Document Number:A95258439

Kolb, D.A. (1984). *Experiential Learning: experience as the source of learning and development*. New Jersey: Prentice-Hall Inc.

Kosslyn, S.M., & Rosenberg, R. (2006). *Psychology in context*. Boston: Pearson/Allyn & Bacon.

Law, M., Cooper, B., Strong, S., Stewart, D., Rigby, P., & Letts, L. (1996). The person-environment-occupation model: A transactive approach to occupational performance. *Canadian Journal of Occupational Therapy*, 63, 9 - 23.

Letts, L., Rigby, P., & Stewart, D. (2003). *Using environments to enable occupational performance*. USA: Slack Incorporated.

Lindquist, J.E., Mack, W., & Parham, L.D. (1982). A synthesis of occupational behavior and sensory integration concepts in theory and practice, part 2: clinical applications. *American Journal of Occupational Therapy*, 36 (7), 433-7.

Lombard, A. (2007a). *Sensory Intelligence: why it matters more than IQ and EQ*. South Africa: Metz Press.

Lombard, A. (2007b). Personal communication May 1, 2007. Available at [lombard@sensoryintelligence.co.za](mailto:lombard@sensoryintelligence.co.za).

Lombard, A. (2007c). *2007 Pilot study*. Unpublished PhD Thesis. University of Cape Town. Retrieved May 1, 2007 from author. Available at lombard@sensoryintelligence.co.za.

Lourens, A., & Smit, I.P.J. (2003). Retention: predicting first-year success. *South African Journal of Higher Education*, 17(2), 169 - 176.

Louw, D.A., & Edwards, D.J.A. (1997). *Psychology: an introduction for students in Southern Africa* (2nd ed.). Johannesburg: Heinemann Higher & Further Education (Pty) Ltd.

Louw, D.A., Van Ede, D.M., & Louw, A.E. (2005). *Human Development* (2nd ed.). Cape Town: Kagiso Tertiary.

Mack, W., Lindquist, J.E., & Parham, L.D. (1982). A synthesis of occupational behavior and sensory integration concepts in theory and practice, part 1: theoretical foundations. *American Journal of Occupational Therapy*, 36 (6), 365-74.

Mailloux, Z., May-Benson, T.A., Summers, C.A., Miller, L.J., Brett-Green, B., Burke, J.P., Cohn, E.S., Koomar, J.A., Parham, L.D., Roley, S.S., Schaaf, R.C., & Schoen, S.A. (2007). Goal attainment scaling as a measure of meaningful outcomes for children with sensory integration disorders. *American Journal of Occupational Therapy*, 61 (2), 254-9.

Matoti, S.N., & Lekhu, M.A. (2008). Problems first year university students bring to science and implications for teaching and learning. 7(2), 126 - 142. Available at [www.sabinet.co.za/web\\_robots/articles/interim/interim\\_v7\\_n2\\_a8.xml](http://www.sabinet.co.za/web_robots/articles/interim/interim_v7_n2_a8.xml).

Maūrtin-Cairncross, A. (2008). Generation Y does things differently. *University of the Western Cape Office of Staff Development*.



Mayer, J.D., & Salovey, P. (1997). *What is emotional intelligence?* In P. Salovey & D. Sluyter (Eds.), *Emotional development and emotional intelligence: Implications for educators* (pp. 3-31). New York: Basic Books.

McMillan, J. H., & Schumacher, S. (2006). *Research in education: evidence-based inquiry* (6th ed.). USA: Pearson Education Incorporated.

Miller, R., Bradbury, J., & Acutt, K. (2001). Academic performance of English first and second-language students: a retrospective appraisal. *South African Journal of Higher Education*, 15(1), 147 - 153.

Molineux, M. (Ed.). (2004). *Occupation for occupational therapists*. UK: Blackwell Publishing Ltd.

Mulligan, S. (1998). Patterns of sensory integration dysfunction: A confirmatory factor analysis. *American Journal of Occupational Therapy*, 52(10), 819 - 828.

Murphy, A. & Janeke, H.C. (2009). The relationship between thinking styles and emotional intelligence: an exploratory study. *South African Journal of Psychology*, 39(3), 357 - 375.

Neistadt, M.E. & Crepeau, E.B. (1998). *Willard & Spackman's occupational therapy* (9th ed.). Philadelphia: Lippincott-Raven Publishers.

Neuman, A., Greenberg, D.F., Labovitz, D.R., & Suzuki, L.A. (2004). Cross-cultural adaptation of the Sensory Profile: Establishing linguistic equivalency of the Hebrew version. *Occupational Therapy International*, 11(2), 112 - 130.

Ochse, C. (2003). Are positive self-perceptions and expectancies really beneficial in an academic context. *South African Journal of Higher Education*, 17(1), 67 - 73.

Office of Development and Public Affairs University of the Western Cape. (2008). Available at [www.uwc.ac.za](http://www.uwc.ac.za).

Ogunniyi, M. B. (1992). *Descriptive research. Chapter 5. In Understanding Research in the Social Sciences*. University press PLC.

Ornstein, R. (1986). *Multimind: A new way of looking at human behaviour*. New York: Anchor Books, Doubleday.

Ornstein, R. E. (1977). *The Psychology of Consciousness* (2nd ed.). New York: Harcourt Brace, Jovanovich.

Parham, L.D., Cohn, E.S., Spitzer, S., Koomar, J., Miller, L.J., Burke, J.P., Brett-Green, B., Mailloux, Z., May-Benson, T.A., Roley, S.S., Schaaf, R.C. Schoen, S.A., & Summers, C.A. (2007). Fidelity in sensory integration intervention research. *American Journal of Occupational Therapy*, 61 (2), 216-27.

Parham, L. D., & Fazio, L. (Eds.) (1996). *Play in occupational therapy for children (1st ed.)*. St. Louis, MO: Mosby Publishers.

Parham, L. D., & Fazio, L. (Eds.) (2008). *Play in occupational therapy for children (2nd ed.)*. St. Louis, MO: Mosby Publishers.

Parham, L.D., Roley, S.S., May-Benson, T.A., Koomar, J., Brett-Green, B., Burke, J.P., Cohn, E.S., Mailloux, Z., Miller, L.J., & Schaaf, R.C. (2011). Development of a fidelity measure for research on the effectiveness of the Ayres Sensory Integration intervention. *American Journal of Occupational Therapy*, 65 (2), 133-42.

Pascarella, E. T., & Terenzini, P.T. (1980). Predicting persistence and voluntary dropout decisions from a theoretical model. *Journal of Higher Education*, 51, 60 - 75.

Pattison, M. (2007). The occupational therapy 'landscape of the future': the results from the Focus Day at the 27th Council Meeting of the World Federation of Occupational Therapists. *WFOT Bulletin*, 56 (November), 5 - 10.

Pattison, M. (2008). Creating our own destiny. *British Journal of Occupational Therapy*, Retrieved November 10, 2010 from [http://findarticles.com/p/articles/mi\\_6805/is\\_10\\_71/ai\\_n39151494/](http://findarticles.com/p/articles/mi_6805/is_10_71/ai_n39151494/)

Peterson, M., & Taylor, P.D. (2009). Whole schooling and reclaiming youth. *Reclaiming children and youth*, 18(3), 29 - 33.

Pfeiffer, B. & Kinnealey, M. (2003). Treatment of sensory defensiveness in adults. *Occupational Therapy International*, 10(3), 175 - 184.

Piaget, J. (1952). *The origins of intelligence in children*. New York: International Universities.

Pillay, P. (2005). *The utilisation of formative and summative electronic assessments in historically disadvantaged institutions (HDI) in the Western Cape*. Unpublished Master's Thesis. Cape Town: University of the Western Cape.

Provost, D., & Oetter, P. (1993). The Sensory Rating Scale for Infants and Young Children: Development and reliability. *Physical and Occupational Therapy in Pediatrics*, 13(4), 15 - 35.

Ragneskog, H., & Kihlgren, M.(1997). Music and other strategies to improve the care of agitated patients with dementia: Interviews with experienced staff. *Scandinavian Journal of Caring Sciences*, 11(3), 176 - 182.

Rieke, E.F., & Anderson, D. (2009). Adolescent/Adult Sensory Profile and Obsessive-Compulsive Disorder. *American Journal of Occupational Therapy*, 63(2), 138 - 145.

Rudman, D.L., & Dennhardt, S. (2008). Shaping knowledge regarding occupation: examining the cultural underpinnings of the evolving concept of occupational identity. *Australian Occupational Therapy Journal*, 55, 153 - 162.

Rutter, M. (1990). Psychosocial resilience and protective mechanisms. In Rolf, J., Masten, A., Cicchetti, D., Nuechterlein, K., & Weintraub, S. (Eds.), *Risk and Protective Factors in the Development of Psychopathology*. New York: Cambridge University Press.

Salovey, P., & Mayer, J.D. (1990). Emotional Intelligence. *Imagination, Cognition, and Personality*, 9, 185 - 211.

Schindler, A., Mozzanica, F., Ginocchio, D., Peri, A., Bottero, A., & Ottaviani, F. (2010). Reliability and clinical validity of the Italian Reflux Symptom Index. *Journal of Voice*, 24(3), 354 - 358.

Schreiber, B., & Jansen, S. (2008, July 16). *Effective use of Student Support Services: Effective recognition and prompt referral*. Workshop presented at the University of the Western Cape's Centre for Student Support Services. Retrieved July 16, 2008, from authors.

Schunk, D.H. (2008). *Learning Theories: An Educational Perspective* (5th ed.). New Jersey: Pearson Education Inc.

*Sensory Processing Disorders (SPD)*. (2006). *Sensory processing in everyday life- Introduction to concepts*. Retrieved May 24, 2006 from [http://classes.kumc.edu/sah/resources/sensory\\_processing/index.htm](http://classes.kumc.edu/sah/resources/sensory_processing/index.htm).

Skinner, B.F. (1976). *Walden two*. New York: Macmillan.

*Statistics*. (2010). Retrieved November 10, 2010, from <http://www.statistics.com/resources/glossary/>

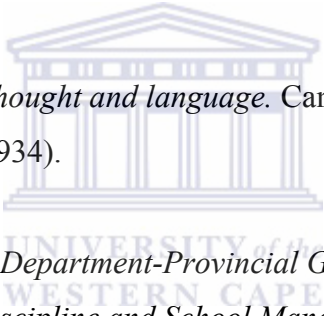
The Wisdom Fund (TWF). (2009). Retrieved September 11, 2009, from <http://www.twf.org/Sayings/Sayings4.html>

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, 45, 89 - 125.

Van Rensburg, G.H. (2009). The development of a self-assessment learning style instrument for higher education. *South African Journal of Higher Education*. 23(1). 179 - 192.

Vargas, S., & Camilli, G. (1999). A meta-analysis of research on sensory integration treatment. *American Journal of Occupational Therapy*, 53(2), 189 - 198.

Vygotsky, L.S. (1962). *Thought and language*. Cambridge, M.A: MIT Press (first published in Russian in 1934).



*Western Cape Education Department-Provincial Government of the Western Cape. (2007). Learner Discipline and School Management: a practical guide to understanding and managing learner behaviour within the school context. Cape Town: Education Management & Development Centre: Metropole North.*

*Wikipedia*. (2009). Retrieved October 14, 2009, from [http://en.wikipedia.org/wiki/Emotional\\_Intelligence](http://en.wikipedia.org/wiki/Emotional_Intelligence)

Wilbarger, P. & Wilbarger, J.L. (1991). *Sensory defensiveness in children aged 2-12*. Santa Barbara, CA: Avanti Educational Programs.

Wilson, L., & Wilcock, A. (2005). Occupational Balance: what tips the scales for new students?. *British Journal of Occupational Therapy*, 68(7), 319 - 323.

Wittenberg, I. (2001). Being at university: a time of growth or unbearable stress. *Psychoanalytic studies*, 3(3&4), 307 - 312.

Wood, T. (2009). Personal communication Nov 10, 2009. Available at [twood@uwc.ac.za](mailto:twood@uwc.ac.za).

Yorke, M. (1999). *Leaving early. Undergraduate non-completion in higher education*. London and Philadelphia: Falmer press.



## APPENDIX 1

### SENSORY PROFILE 2008 CODEBOOK

Label	Code
<b>Q1.</b>	<b>Enter the number that has been given to you in an envelope.</b>
Research ID entry	1 – 20000 = range
<b>Q2.</b>	<b>Tick on the options provided to indicate your current course of study.</b>
A. Course	0 = Dietetics 1 = Human Ecology 2 = Natural Medicine 3 = Nursing 4 = Occupational Therapy 5 = Physiotherapy 6 = Psychology 7 = Public Health (Social Work) 8 = Sport, Recreation & Exercise Sciences
<b>Q3.</b>	<b>Are you a male or a female? Tick on the options provided.</b>
B. Gender	1 = Male 2 = Female
<b>Q4.</b>	<b>Which of the following racial groupings would you classify yourself as?</b>
C. Race	0 = Asian 1 = Black 2 = Coloured 3 = Indian 4 = White 5 = Other
<b>Q5.</b>	<b>What year were you born? Please insert using the number keys.</b>
D. Year born	1900 – 2000 = range
<b>Q6.</b>	<b>Where are you residing (staying) while you are study at UWC?</b>
E. Residence	0 = At home 1 = UWC Residences 2 = Other residences within Western Cape 3 = Other residences outside of the Western Cape
<b>Q7.</b>	<b>Is your home within an urban or rural area?</b>
F. Urban/Rural	0 = Urban 1 = Rural
<b>Q8.</b>	<b>Using the letter keys, please insert the name of the high school that you attended.</b>
G. High school	

<b>Q9.</b>	<b>I leave or move to another section when I smell a strong odour in a store (for example, bath products, candles, perfumes)</b>
1. Smell odours	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q10.</b>	<b>I add spice to my food.</b>
2. Add spice	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q11.</b>	<b>I don't smell things that other people say they smell.</b>
3. Don't smell	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q12.</b>	<b>I enjoy being close to people who wear perfume or cologne.</b>
4. Perfume	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q13.</b>	<b>I only eat familiar foods.</b>
5. Familiar foods	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q14.</b>	<b>Many foods taste bland to me (in other words, food tastes plain or does not have a lot of flavour).</b>
6. Bland foods	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q15.</b>	<b>I don't like strong tasting mints or sweets (for example, hot/cinnamon or sour sweets).</b>
7. Strong sweets	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always



<b>Q16.</b>	<b>I go over to smell fresh flowers when I see them.</b>
8. Smell flowers	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q17.</b>	<b>I'm afraid of heights.</b>
9. Heights	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q18.</b>	<b>I enjoy how it feels to move about (for example, dancing, running).</b>
10. Dancing	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q19.</b>	<b>I avoid elevators and/or escalators because I dislike the movement.</b>
11. Elevators	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q20.</b>	<b>I trip or bump into things.</b>
12. Trip	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q21.</b>	<b>I dislike the movement of riding in a car.</b>
13. Car	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q22.</b>	<b>I choose to engage in physical activities.</b>
14. Physical	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always

<b>Q23.</b>	<b>I am unsure of footing when walking on stairs (for example, I trip, lose balance, and/or need to hold the rail).</b>
15. Stairs	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q24.</b>	<b>I become dizzy easily (for example, after bending over, getting up too fast).</b>
16. Dizzy	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q25.</b>	<b>I like to go to places that have bright lights and that are colourful.</b>
17. Bright lights	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q26.</b>	<b>I keep the shades down during the day when I am at home.</b>
18. Shades	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q27.</b>	<b>I like to wear colourful clothing.</b>
19. Colour	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q28.</b>	<b>I become frustrated when trying to find something in a crowded drawer or messy room.</b>
20. Messy room	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q29.</b>	<b>I miss the street, building, or room signs when trying to go somewhere new.</b>
21. Miss street	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always

<b>Q30.</b>	<b>I am bothered by unsteady or fast moving visual images in movies or TV.</b>
22. TV	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q31.</b>	<b>I don't notice when people come into the room.</b>
23. Notice people	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q32.</b>	<b>I choose to shop in smaller stores because I'm overwhelmed in large stores.</b>
24. Stores	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q33.</b>	<b>I become bothered when I see lots of movement around me (for example, at a busy mall, parade, carnival).</b>
25. Bothered by movement	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q34.</b>	<b>I limit distractions when I am working (for example, I close the door, or turn off the TV)</b>
26. Distractions	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q35.</b>	<b>I dislike having my back rubbed.</b>
27. Back rub	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q36.</b>	<b>I like how it feels to get my hair cut.</b>
28. Hair cut	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always

<b>Q37.</b>	<b>I avoid or wear gloves during activities that will make my hands messy.</b>
29. Wear gloves	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q38.</b>	<b>I touch others when I'm talking (for example, I put my hand on their shoulder or shake their hands).</b>
30. Touch others	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q39.</b>	<b>I am bothered by the feeling in my mouth when I wake up in the morning.</b>
31. Mouth	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q40.</b>	<b>I like to go barefoot.</b>
32. Barefoot	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q41.</b>	<b>I'm uncomfortable wearing certain fabrics (for example, wool, silk, corduroy, tags in clothing).</b>
33. Fabrics	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q42.</b>	<b>I don't like particular food textures (for example, peaches with skin, maize porridge, cottage cheese, chunky peanut butter).</b>
34. Food texture	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always

<b>Q43.</b>	<b>I move away when others get too close to me.</b>
35. Too close	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q44.</b>	<b>I don't seem to notice when my face or hands are dirty.</b>
36. Dirty hands	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q45.</b>	<b>I get scrapes or bruises but don't remember how I got them.</b>
37. Bruises	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q46.</b>	<b>I avoid standing in lines or standing close to other people because I don't like to get too close to others.</b>
38. Getting close	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q47.</b>	<b>I don't seem to notice when someone touches my arm or back.</b>
39. Don't notice	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q48.</b>	<b>I work on two or more tasks at the same time.</b>
40. Tasks	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q49.</b>	<b>It takes me more time than other people to wake up in the morning.</b>
41. Wake up	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always

<b>Q50.</b>	<b>I do things on the spur of the moment (in other words, I do things without making a plan ahead of time)</b>
42. Spur of moment	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q51.</b>	<b>I find time to get away from my busy life and spend time by myself.</b>
43. Time away	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q52.</b>	<b>I seem slower than others when trying to follow an activity or task.</b>
44. Slow	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q53.</b>	<b>I don't get jokes as quickly as others.</b>
45. Jokes	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q54.</b>	<b>I stay away from crowds.</b>
46. Crowds	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q55.</b>	<b>I find activities to perform in front of others (for example, music, sports, acting, public speaking, and answering questions in class).</b>
47. Performance	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always

<b>Q56.</b>	<b>I find it hard to concentrate for the whole time when sitting in a long class or a meeting.</b>
48. Concentrate	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q57.</b>	<b>I avoid situations where unexpected things might happen (for example, going to unfamiliar places or being around people I don't know).</b>
49. Unexpected	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q58.</b>	<b>I hum, whistle, sing, or make other noises.</b>
50. Hum	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q59.</b>	<b>I startle easily at unexpected or loud noises (for example, vacuum cleaner, dog barking, telephone ringing).</b>
51. Loud noises	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q60.</b>	<b>I have trouble following what people are saying when they talk fast or about unfamiliar topics.</b>
52. Talk fast	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q61.</b>	<b>I leave the room when others are watching TV, or I ask them to turn it down.</b>
53. TV noise	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always

<b>Q62.</b>	<b>I am distracted if there is a lot of noise around.</b>
54. Distracted	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q63.</b>	<b>I don't notice when my name is called.</b>
55. Notice name	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q64.</b>	<b>I use strategies to drown out sound (for example, close the door, cover my ears, wear ear plugs).</b>
56. Drown out sound	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q65.</b>	<b>I stay away from noisy settings.</b>
57. Noisy settings	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q66.</b>	<b>I like to attend events with a lot of music.</b>
58. Shades	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q67.</b>	<b>I have to ask people to repeat things.</b>
59. Colour	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always
<b>Q68.</b>	<b>I find it difficult to work with background noise (for example, fan, radio).</b>
60. Background noise	1 = Almost Never 2 = Seldom 3 = Occasionally 4 = Frequently 5 = Almost Always





# UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-9592604, Fax: 27 21-9592606

E-mail: kbagus@uwc.ac.za

## INFORMATION SHEET

**Project Title:** The relationship between sensory integrative profiles and academic achievement of first year Health Sciences students at the University of the Western Cape.

### **What is this study about?**

This is a research project being conducted by Kulsum Bagus at the University of the Western Cape. I am inviting you to participate in this research project because you are a registered first year student from the Faculty of the Community and Health Sciences (FCHS) at the University of the Western Cape (UWC). The purpose of this research project is to gain an understanding of the sensory integrative profiles of first year students and the relationship with academic results. Sensory integrative profiles relate to how a person responds to information coming from the senses like sight, smell, hearing etc.

### **What will I be asked to do if I agree to participate?**

You will be asked to complete a questionnaire that would enable the researcher to determine the sensory integrative profile as well as demographic information of the student participant. The questionnaire is about everyday experiences and relate to how a person experiences it using their senses. The questionnaire should take about 10 minutes to complete.

### **Would my participation in this study be kept confidential?**

We will do our best to keep your personal information confidential. To help protect your confidentiality each participant's information will be labelled by a research identity code only. Through the use of this research identity code, the researcher will be able to link the questionnaire to your identity. If I write a report or article about this research project, your identity will be protected to the maximum extent possible. I will also access your academic results for the purposes of this research and all information will be handled confidentially.

### **What are the risks of this research?**

There are no known risks associated with participating in this research project.

### **What are the benefits of this research?**

The benefits to you include gaining an understanding of how you respond to everyday experiences in using your senses. The results of the research project may help the researcher learn more about the sensory integrative profiles first year students and if there is a relationship to academic results. This could direct lecturers and university staff members to provide teaching and learning opportunities that are in line with the sensory needs of students.

**Do I have to be in this research and may I stop participating at any time?**

Your participation in this research is completely voluntary. It is not a course requirement. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

**Is any assistance available if I am negatively affected by participating in this study?**

There are no known risks associated with participating in this research project. If there is however any issues or topics that the participant would like to discuss further, he/she may contact the researcher. Another option could be to utilize the services of the UWC Institute for student counselling that is open to all university students.

**What if I have questions?**

This research is being conducted by Kulsum Bagus registered under the Department of Occupational Therapy at the University of the Western Cape. If you have any questions about the research study itself, please contact Kulsum Bagus at the Academic Development Unit of the Faculty of Community and Health Sciences at UWC. My contact details are as follows:  
Telephone: (021) 959-2604; Cell number: 082 455 0904; E-mail: [kbagus@uwc.ac.za](mailto:kbagus@uwc.ac.za).

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Head of Department: Jo-celene De Jongh

Dean of the Faculty of Community and Health Sciences: Prof. Ratie Mpofo

University of the Western Cape

Private Bag X17

Bellville 7535

This research has been approved by the University of the Western Cape's Senate Research Committee and Ethics Committee.



# UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-9592604, Fax: 27 21-9592606

E-mail: kbagus@uwc.ac.za

## CONSENT FORM

**Title of Research Project:** The relationship between the sensory integrative profiles and academic achievement of first year Health Sciences students at the University of the Western Cape.

The study has been described to me by means of the Information Sheet, in language that I understand and I freely and voluntarily agree to participate. My questions about the study have been answered. I understand that my identity will not be disclosed and that I may withdraw from the study without giving a reason at any time and this will not negatively affect me in any way. I furthermore understand that the researcher will access my academic results for the purposes of this research and that all information will be handled confidentially.

Participant's name.....

Participant's signature.....

Witness.....

Date.....



Should you have any questions regarding this study or wish to report any problems you have experienced related to the study, please contact the study coordinator:

**Study Coordinator's Name: Kulsum Bagus**

University of the Western Cape

Private Bag X17, Belville 7535

Telephone: (021) 959-2604

Cell: 082 455 0904

Fax: (021) 959-2606

Email: kbagus@uwc.ac.za