

**Prediction of academic success  
of first year  
National Certificate Vocational (Level 2) students  
at FET colleges.**

by

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## Declaration

I declare that the dissertation hereby submitted by me for the degree Magister Educationis in Educational Psychology at the Potchefstroom Campus of the North West University is my own work and has not previously been submitted by me at this or any other university.

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C. SMIT

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Date

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## **Summary**

Since 2006 Further Education and Training (FET) Colleges have been recapitalised through massive government investment in order to improve infrastructure, implement a more relevant curriculum and assist college learners financially to gain access to the different learning programmes. A new curriculum with 11 programmes was introduced and implemented under the National Certificate Vocational (NCV). The results of the 2007 examinations, were disappointing and in general, the national performance of the learners was dismal. Policy requirements for certification and promotion to the next level stipulated that learners need to pass all 7 subjects in a programme.

The main aim of the study was to identify variables that are the best predictors of academic success of first year FET students. Thus, if these predictors are considered during the admission process of first year FET students, it could lead to overall improved first year pass rate at FET Colleges and contribute towards the enhancement of human resources and economical development of our country.

In order to achieve the research aim and objectives, a literature study and an empirical investigation were conducted. The literature study focussed on cognitive and non-cognitive factors that contribute to academic success of students at colleges.

The empirical investigation departed from a positivist paradigm to determine which variables contributed the best towards the prediction of academic success of first year NCV Level 2 students at FET Colleges and a quantitative non-experimental, ex post facto approach was followed. The results of the General Scholastic Aptitude Test (GSAT), the Learning and Study Strategies Inventory – High School version (LASSI-HS), grade mark average and biographical details of the registered first year NCV Level 2 students of the Vuselela FET College (Potchefstroom and Klerksdorp campuses) in 2008 (n=309), were used to determine whether any of these variables significantly predicted the academic success of these students.

The investigation revealed that:

- None of the LASSI-HS scales were predictors of academic success of the first year NCV Level 2 students;

- The GSAT (Total) was a predictor of academic success of these students;
- None of the biographical variables, i.e. age or gender, were predictors of academic success; and
- Grade mark average on students' last school reports, was a predictor of academic success.

These findings revealed that Grade mark average, and GSAT-(Total) (which is also an indication of intelligence quotient (IQ)) were the best predictors of academic success of first year NCV Level 2 students at the Potchefstroom and Klerksdorp campuses of the Vuselela FET College.

Key words: *Predictors, academic success, First year students, FET Colleges, LASSI-HS, GSAT.*

## **Opsomming**

Sedert 2006 het Vêrdere Onderwys en Opleiding (VOO) Kolleges grootskaalse regeringsinvestering ontvang ten einde die infrastruktuur te verbeter, 'n meer relevante kurrikulum te implementeer, asook om finansiële ondersteuning aan kollege leerders te bied om toegang tot die verskillende leerprogramme te verkry. 'n Nuwe kurrikulum is bekendgestel en geïmplementeer wat 11 leerprogramme bevat wat deel vorm van die Nasionale Beroepsgerigte Sertifikaat (NBS). Die uitslae van die 2007 eksamens was teleurstellend en oor die algemeen was die nasionale prestasie van leerders baie swak. Volgens die beleidsvereistes vir sertifisering en bevordering na die volgende vlak, moet die leerders al sewe vakke in 'n program slaag.

Die hoofdoel van hierdie studie was om veranderlikes te identifiseer wat die beste voorspellers van die akademiese sukses van eerstejaar VOO studente is. Indien hierdie voorspellers in ag geneem word tydens toelatingsproses van die eerstejaar VOO studente, kan dit aanleiding tot 'n algemene verbetering van die eerstejaar slaagsyfer by VOO Kolleges gee en tot die verbetering van menslike hulpbronne en die ekonomiese ontwikkeling van die land bydra.

Ten einde hierdie navorsingsdoelwit en -doelstellings te kon bereik, is 'n literatuurstudie en 'n empiriese ondersoek onderneem. Die literatuurstudie het gefokus op kognitiewe en nie-kognitiewe faktore wat bydra tot die akademiese sukses van die kollege student.

Die empiriese ondersoek het vanuit 'n positivistiese paradigma vertrek om te bepaal watter veranderlikes die beste tot die voorspelling van akademiese sukses van eerstejaar NBS Vlak 2 studente by VOO Kolleges bydra. 'n Kwantitatiewe, nie-eksperimentele, ex post facto benadering is gevolg. Die uitslag van die Algemene Skolastiese Aanleg Toets (ASAT), die *Learning and Study Strategies Inventory – High School version* (LASSI-HS), die gemiddelde graadpunt, asook die biografiese besonderhede van die geregistreerde eerstejaar NBS Vlak 2 studente van die Vuselela VOO Kollege (Potchefstroom en Klerksdorp kampusse) in 2008 ('n=309), is gebruik om te bepaal of enige van die veranderlikes die akademiese sukses van dié studente, betekenisvol kon voorspel.

Die ondersoek het aangedui dat:

- Geeneen van die LASSI-HS skale was 'n voorspeller van die akademiese sukses van die eerste jaar NBS Vlak 2 studente nie;
- Die ASAT-Totaal was 'n voorspeller van die akademiese sukses van dié studente;
- Geeneen van die biografiese veranderlikes, byvoorbeeld, ouderdom of geslag, was voorspellers van akademiese sukses nie; en
- Die gemiddelde graadpunt op die student se laaste skoolrapport, was 'n voorspeller van akademiese sukses.

Hierdie bevindinge het aangedui dat die gemiddelde graadpunt en ASAT –Totaal (wat ook 'n aanduiding van die intelligensie kwosiënt (IK) is) die beste voorspellers van die akademiese sukses van eerstejaar NBS Vlak 2 studente by die Potchefstroom en Klerksdorp kampusse van die Vuselela VOO Kollege was.

Sleutelwoorde: *Voorspellers, akademiese sukses, eerstejaar studente, kollege, VOO Kolleges, LASSI-HS, ASAT.*

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## **Acronyms and Terminology**

ANC	Africa National Congress
CEO	Chief Executive Officer
DHET	Department of Higher Education and Training
DOE	Department of Education
FET	Further Education and Training
FETC	Further Education and Training Certificate
GET	General Education and Training
GETC	General Education and Training Certificate
GSAT	General Scholastic Aptitude Test
HE	Higher Education
HED	Higher Education Department
HET	Higher Education and Training
HSRC	Human Sciences Research Council
IQ	Intelligence Quotient
JIPSA	Joint Initiative on Priority Skills Acquisition
LASSI	Learning and Study Strategies Inventory
LASSI-HS	Learning and Study Strategies Inventory – High School
NBT	National Benchmark Tests
NCV	National Certificate Vocational
NEET	Not in Employment, Education or Training
NQF	National Qualifications Framework
NSC	National Senior Certificate
RPL	Recognition of Prior Learning
SAQA	South African Qualifications Authority
SETA	Skills Education Training Authorities in South Africa
SRI	Student Readiness Inventory
TVET	Technical and Vocational Education and Training
Umalusi	Quality Assurance Body for General and Further Education (Schools and Colleges)
WCED	Western Cape Education Department
ZPD	Zone of Proximal Development

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

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## **1.1 Introduction.**

Further Education and Training (FET) Colleges have become a major thrust in the government's plans for skills development and further education (Pretorius, 2007:5). The Further Education and Training Colleges Act (16/2006) aims to provide for the establishment and regulation of further education and training in South Africa. In terms of the preamble of the FET Colleges Act (16/2006), further education and training programmes and FET Colleges should be restructured and transformed to respond to a greater extent to the human resources and economic and development needs of South Africa. South Africa lacks artisans in many sectors and the shortage of suitably qualified and competent persons with vocational skills is the result of the successful growth of the economy (Pretorius, 2007:4). Thus, the aim of the FET Colleges Act (16/2006) is to redress past discrimination by giving equal access and further education and training to persons who have been marginalised in the past, such as women, the disabled and the disadvantaged.

South Africa's National Qualifications Framework (NQF) recognises three broad bands of education: General Education and Training (GET), FET, and Higher Education and Training (HET) (SA, 2001:1). Under the South African Schools Act (84/1996), education is compulsory for all South Africans from age 6 (Grade R) to age 15, or the completion of Grade 9. After completion of Grade 9, learners have the option to choose between the general pathway in senior secondary schools and the vocational pathway at FET Colleges. The FET band, functions as a band within the NQF, which builds on the foundation provided, by the GET band (ordinary schooling) (Kraak & Hall, 1999:1, Kraak, 2005:79). By virtue of its unique position it plays a pivotal role in integrating prior learning with continued education, and offers opportunities for school leavers to obtain a vocational qualification (Parker & Walters, 2008:72). In South Africa, expanding further education and training is seen as a way to open access to post-school education and improve the diversity in the tertiary system (Vinjevold, 2008b:1).

Although the FET sector in South Africa is smaller than in most other countries, there are approximately 63 000 students enrolled in the National Vocational Certificate (NCV) programmes per annum, but the aim is to increase the number of enrolments (Vinjevoid, 2008b:1). Over the past few years, the number of the students has steadily increased, as did their diversity in ability and aptitude (Vinjevoid, 2008b:1). During 2006, the National Government budgeted for the nationwide upgrading of FET-Colleges. This included the improvement of simulation- and computer rooms, workshops and other infrastructure to cater for students from schools, as well as for unemployed persons with inadequate qualifications. The idea is for FET students to gain access to pre-university training whilst they are doing vocational training (Vinjevoid, 2008b:1).

Vinjevoid, the Deputy Director General, Department of Education, responsible for the implementation of the FET programme, further stated that teething problems were experienced in the first year of implementation of the vocational programmes introduced at FET Colleges in 2007 (Vinjevoid, 2008a:1). The investigation of the Department of Education into the dropout and failure rate at FET Colleges revealed that poor selection processes, limited career guidance and low attendance rates, among other factors, affected student retention and performance and that many FET Colleges were experiencing challenges with regard to fair and transparent selection and placement procedures (Vinjevoid, 2008a:1).

The main challenges currently faced by FET Colleges are 1) the potential, aptitude and interests of the students that need to be taken into account when selecting a specific programme; 2) selecting the right learners for the right programmes, i.e. engineering, tourism, hospitality, office admin, management; and 3) what the odds are against academic success for the students. Thus, there is a need to identify suitable indicators that will result in a more accurate prediction of academic success for these students (Vinjevoid, 2008a:1).

## 1.2 Problem Statement.

In terms of the FET Colleges Act (16/2006) the formal minimum entry requirements at FET Colleges are:

- A Grade 9 certificate; or;
- A NQF (Level 1) qualification; or
- An approved bridging programme designed for the specific purpose to access NQF (Level 2); or
- A Recognition of Prior Learning Assessment (RPL) to meet the basic requirements for access to NQF (Level 2).

In addition to the formal requirements, FET Colleges may base student admission on diagnostic tests or other placement procedures (FET Colleges Act, 16/2006).

The above-mentioned minimum entry requirements enable students from diverse educational backgrounds to apply for admission to FET Colleges. For example, students with Grade 9 certificates from either special education schools or general education schools are entitled to apply for admission to FET Colleges. On the basis of the results of a national survey Taylor *et al.* (2003:4) found that approximately 80% of the schools in South Africa are dysfunctional, i.e. schools that are not functioning adequately, particularly in terms of performance in mathematics. Dysfunctional schools require organisational stabilisation and the establishment of management systems to set conditions conducive for effective teaching and learning (Taylor *et al.*, 2003:4). The implication of the finding of Taylor *et al.* (2003:4) is that inadequate and inappropriate education is provided at these schools. According to Papier (2009:7), a large portion of students applying for admission to FET Colleges come from inadequate educational backgrounds due to the national marketing strategy that attracted school learners who performed poorly and saw college as an easier option. She further stated that the potential students were under prepared for the demand of the college curriculum (Papier, 2009:7). Thus, although these students were in possession of formal Grade 9 certificates, they were under-prepared by the school system in subjects like mathematics, science and computer skills (Papier, 2009:41).

It follows that the range of students normally applying for admission to FET Colleges usually include students with special education needs, students with inadequate literacy and numeracy skills, adult students who were disadvantaged or marginalised and did not have access to further education and training opportunities, as well as appropriately qualified students (Papier, 2009:41, Akoojee & McGrath, 2008:16)

Applications for admission to FET Colleges are usually considered during January at the beginning of the academic year. In practice, this means none of the students applying for admission during this period and who wrote the Grade 9 national examinations during the previous year are in possession of a formal Grade 9 certificate issued by the Department of Education (DOE) or the National Qualifications Agency, known as Umalusi (Meyer, 2008, Serrao, 2008).

The fact that most applicants are not in possession of officially recognized certificates, implies that FET Colleges are obliged to admit students based on their school reports. The problem that arises is that these reports vary in quality and content and may not be accurate indicators of the academic standard stipulated by the South African Qualifications Authority (SAQA). According to Vandeyar and Killen (2003:120-122), the principles of high quality assessment practices are reliability, fairness, validity, discrimination, meaningfulness and contribution to learning. If these principles are misunderstood or ignored due to improper training or clarifications thereof, the results are worthless (Vandeyar & Killen, 2003:120, 133).

Akoojee and McGrath (2008:16) contended that admission, assessment and funding have prevented, rather than enabled, institutions to be responsive to all applicants and that the waiving of the requirement that links schooling certification with admission may be a move in the right direction. However, they warn that without the provision of appropriate support to FET lecturers, it will not be possible to make up for learning deficits in cases of inadequate schooling (Akoojee & McGrath, 2008:16). According to Swart (2009:4) the validity and reliability of the academic merit versus social transformation criteria, which are currently applied in South Africa for selection at educational institutions, leave much to be improved on. Swart (2009:4) proposed that admission and selection criteria are

being manipulated to serve political and social transformational agendas. He also questioned the reliance of school results as criteria for selection (Swart, 2009:4).

Vinjevold (2008b:1) acknowledged that some FET Colleges have innovative admission processes and requirements in place, but she questioned whether these processes and requirements lead to appropriate academic outcomes.

In order to facilitate the admission and placement processes of prospective students at the Potchefstroom and Klerksdorp campuses of the Vuselela FET College in the North West province, the following psychometric instruments are administered to all prospective students.

- The General Scholastic Aptitude Test (GSAT) senior shortened power form;
- The Learning and Study Strategies Inventory High School Version (LASSI-HS);  
and
- Last school reports were used to calculate the average grade percentage for each student.

The results of these psychometric assessments, together with the school results reflected in the applicant's last school report, are used for selection and placement purposes at Vuselela FET College (Meyer, 2008, Oosthuizen, 2007).

The Vuselela FET College initially adopted the policy that only students with a GSAT-stanine score of at least 3 (three) would be admitted. Nevertheless, since 2007 there has been a lot of pressure from the National Department of Education on FET Colleges to increase the admission rate of students (Oosthuizen, 2007). This pressure has obligated the management of the Vuselela FET College to lower its admission policy by admitting students with GSAT-test stanine scores of 1 (one) (Oosthuizen, 2007).

First year students are students who are enrolling for their first year of study in the National Certificate Vocational (NCV) Level 2 course. They may have been at school, worked, travelled or enrolled for another course of study in the previous year, but were

not enrolled for a formal NCV Level 2 course at the Vuselela FET College or any other FET College.

Due to the unique and diverse range of students that apply for admission into FET Colleges, there is a need to identify admission criteria that could serve as valid predictors of academic success for first year NCV Level 2 students (Papier, 2009:7).

In the light of the aforementioned, the researcher wished to find answers to the following research questions:

- Which factors contributed towards the prediction of academic success of first year NCV Level 2 students at FET Colleges?
- To what extent do the results obtained from psychometric and scholastic assessments contribute towards the prediction of academic success of first year NCV Level 2 students at an FET College?
- Which admission criteria are the best predictors of academic success of first year NCV Level 2 students at an FET College?
- What is the relationship between biographical variables such as gender and age and the academic success of first year NCV Level 2 students at an FET College?

### **1.3 Aims of the Research.**

Related to the above-mentioned research questions, the aims of the research were to:

- Identify factors that may contribute towards the prediction of academic success of first year NCV Level 2 students at FET Colleges by means of a theoretical study.
- Determine quantitatively whether the results obtained from psychometric and scholastic assessments contributed significantly towards the prediction of academic success of first year NCV Level 2 students at an FET College,
- Quantitatively identify the admission criteria which were the best predictors of academic success of first year NCV Level 2 students at an FET College, and

- Determine quantitatively whether there is a relationship between biographical variables such as gender and age and the academic success of first year NCV Level 2 students at an FET College.

## **1.4 Research Design and Methodology.**

### **1.4.1 Literature Study.**

A literature review of recent and relevant literature sources including academic books, monographs, academic articles, conference papers, commission reports, news reports and other relevant literature was undertaken with the aim of identifying admissions criteria, predictors of academic success and the uses of psychometric instruments in the selection and admission of first year students in further education and training programmes.

Databases such as ERIC, EBSCOhost and Internet search engines such as Google Scholar and the Academic Search Premier were used to identify relevant and recent literature sources related to the admission, selection and placement of students at further education and training institutions with specific reference to FET Colleges. For this purpose keywords such as *admission policies, placement policies, admission criteria and procedures, psychometric assessments, FET Colleges, GSAT, LASSI-HS, predictors of academic success, and NCV* were used.

### **1.4.2 Empirical Investigation.**

#### *1.4.2.1 Research design.*

The investigation departed from a positivist paradigm, because statistical data analyses were done to determine which variables contributed the best towards the prediction of academic success of first year NCV Level 2 students at FET Colleges. Positivists are guided by three basic beliefs:

- The world is external and objective;
- The observer is independent;
- Science is value-free (Easterby-Smith *et al.*, 1991:31).

A quantitative non-experimental, *ex post facto* approach was followed to address the stated research questions and to achieve the aims of the research. *Ex post facto* research draws on cold data to describe occurrences or patterns after an event took place (Mills *et al.*, 2009:40). Attributes such as academic aptitude and self-esteem cannot be manipulated and must therefore be examined through *ex post facto* research (Ary *et al.*, 2009:369).

#### *1.4.2.2 Study population.*

The launching point for any study, regardless of design category is a definition of the study population. It is important that the individuals eligible for inclusion in the study must be representative of the population to which the findings will be applied. Babbie and Mouton (2006:173) define a population as the theoretically specified collection of elements or entities that are researched.

For the purposes of this research the study population consisted of all the first year students who registered at the beginning of 2008 for the National Certificate Vocational (NCV) Level 2 Certificate at the Potchefstroom and Klerksdorp campuses of the Vuselela FET College (n=309).

#### *1.4.2.3 Data Collection*

The purpose of data collection is to learn something about people or things (Mertens, 2005:344). Secondary data sources are existing data that were initially collected for purposes other than the research at hand, such as achievement data, standardised test scores and school demographic data (Wilson, 2009:93).

The secondary data sets that were used in the empirical part of the research, consisted of

- The results that the first year students obtained in the GSAT and LASSI-HS which were administered to them as part of the registration procedure at the Vuselela FET College in Potchefstroom and Klerksdorp campuses in 2008;

- The average grade percentage of each student calculated by using the marks on their last school reports; and
- Academic results of the first year NCV Level 2 students at the end of 2008. Official policy requirements specify, that learners need to complete all seven subjects at the particular level in order to obtain a certificate (Papier, 2009:4). For the purposes of this study, the researcher regarded the first year student as academically successful if he/she passed all seven subjects in the first year of study and received a certificate. If a student cancelled his/her first year studies during the academic year, or failed to receive a certificate at the end of the academic year, the student was considered as academically unsuccessful.

With the permission of the Vuselela FET College, secondary data sets were made available to the researcher (see Appendices A and B).

#### 1.4.2.3.1 Data collection instruments

- GSAT

The GSAT is a standardised South African aptitude test, of academic potential. It is designed to measure both verbal and non-verbal (performance) potential and gives a global score of scholastic aptitude. It is designed for use amongst secondary school learners. The GSAT is a complete revision of previous group intelligence tests and measures the developed general scholastic aptitude of South African learners (Claassen *et al.*, 2008:1). The GSAT was revised in the early 1990's by the HSRC and adapted for use in South Africa and is still in use by a number of psychological assessment practitioners (Foxcroft *et al.*, 2004:24, 76). Psychologists and educators find the test invaluable when assessing aptitude and ability and to facilitate optimal education (Claassen *et al.*, 2008:1, Foxcroft *et al.*, 2004:93).

The manual of the GSAT explains that although the series of sub-tests may be used as an intelligence test under certain circumstances, its prime role is that of estimating general scholastic aptitude.

The estimate of general scholastic aptitude is useful for both environmentally disadvantaged and non-environmentally disadvantaged students. The norm score gives a relatively good estimate of an individual's present level of reasoning ability and is therefore a reasonable predictor of scholastic aptitude and for that reason scholastic performance (Claassen *et al.*, 1993:25). GSAT scores also give an excellent indication of a student's problem-solving abilities in a scholastic context (Claassen *et al.*, 1993:25).

The GSAT will be discussed in greater detail in Chapter 4.

- LASSI-HS

The LASSI-HS is a high school version of the LASSI and is designed to measure the students' use of learning and study strategies and methods at the secondary school level. Modifications were made to the wording of the items of the LASSI to reflect the vocabulary and learning tasks and demands of a high school environment.

The LASSI-HS has diagnostic and prescriptive measures that assess student processes to facilitate studying and learning (H & H Publishing Company, 1996-2006). This measurement instrument has been translated into over 30 languages and is estimated to be in use by half of all colleges in the United States (Murray, 1998:42). As a reliable tool in the diagnosis of study skills, the LASSI-HS provides the student with feedback about own strengths and weaknesses with regard to thoughts, behaviours, attitudes and beliefs that relate to successful learning.( H & H Publishing Company, 1996-2006) Research has shown that these factors contribute significantly to success in college (H & H Publishing Company, 1996-2006; Stanton, 2009). The final product is a 76-item version of the LASSI-HS (Weinstein & Palmer, 1990:20).

The LASSI-HS can be used as:

- A basis for improving all student's learning and study strategies;
- A diagnostic measure to help identify areas in which students could benefit most from educational interventions;

- A counselling tool for college orientation programmes, developmental education programmes, learning assistance programmes, and learning centres;
- A pre-post achievement measure for students participating in programmes or courses focusing on learning strategies and study skills;
- An evaluation tool to assess the degree of success of intervention programmes or courses (H & H Publishing Company, 1996-2006, Weinstein & Palmer, 1990:5, Weinstein & Palmer, 2002:4).

The LASSI-HS will be discussed in more depth in Chapter 4.

#### *1.4.2.4 Data analysis.*

The data were analysed by means of:

- Descriptive statistics: calculations of summary statistics, e.g. means and standard deviations.
- Confirmatory factor analyses to determine the construct validity of the LASSI-HS.
- The calculation of Cronbach-alpha coefficients to determine the reliability of the LASSI-HS.
- Spearman rank order correlations to determine the relationship between predictor variables and their influence on the students' academic success (whether they have received a certificate after their first year of study, or not).
- Binary logistic regression to determine the best predictor variables of academic success.

### **1.4.3 Ethical Considerations**

#### *1.4.3.1 Obtaining permission to do research.*

Before the researcher commenced with the research, she wrote to the CEO of the Vuselela FET College. She requested permission to conduct the research on existing data sets, and to gain access to the results of the GSAT, LASSI-HS, school reports and end of year results of the 2008 first year NCV Level 2 students at the Potchefstroom and

Klerksdorp campuses. A copy of this letter can be found in Appendix A. A positive response was received from the CEO granting permission to do research (see Appendix B).

#### *1.4.3.2 Other ethical aspects*

The researcher also complied with the following ethical considerations during the study:

- The researcher acknowledged all assistance received;
- No student was identified; and
- The research findings were presented confidentially and without distortion.

### **1.5 Chapter division of the dissertation.**

The chapter division of this dissertation is as follows:

- Chapter 1: Introduction, problem statement, aims method and plan of research.
  - In this chapter, the research problem and aims are stated and a brief description is given about the research design and methodology.
- Chapter 2: Factors relating to the academic achievement of first year students are discussed in this chapter.
- Chapter 3: The admission and selection of first year National Certificate Vocational (NCV) Level 2 students at FET Colleges and factors that could influence their academic success form part of this chapter.
- Chapter 4: Research design and research methodology.
  - In Chapter 4, the research design and method of research is discussed in detail.
- Chapter 5: The results and conclusions are presented and discussed in this chapter.
- Chapter 6: Summary and recommendations. In this chapter, the study was summarised and recommendations were made.

## **1.6 Contributions of the study.**

It is anticipated that this study will shed more light on the most appropriate admission and placement policies and procedures for first year NCV Level 2 students at FET Colleges that could lead to the improvement of their academic success. Furthermore, the purpose of the study was to identify those factors that were the best predictors of academic success of first year FET students. Thus, if these predictors are implemented during the admission process of FET students, it could lead to improved pass rates of first year students at FET Colleges.

# CHAPTER 2. FACTORS RELATING TO THE ACADEMIC ACHIEVEMENT OF FIRST YEAR STUDENTS

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## **2.1 Introduction**

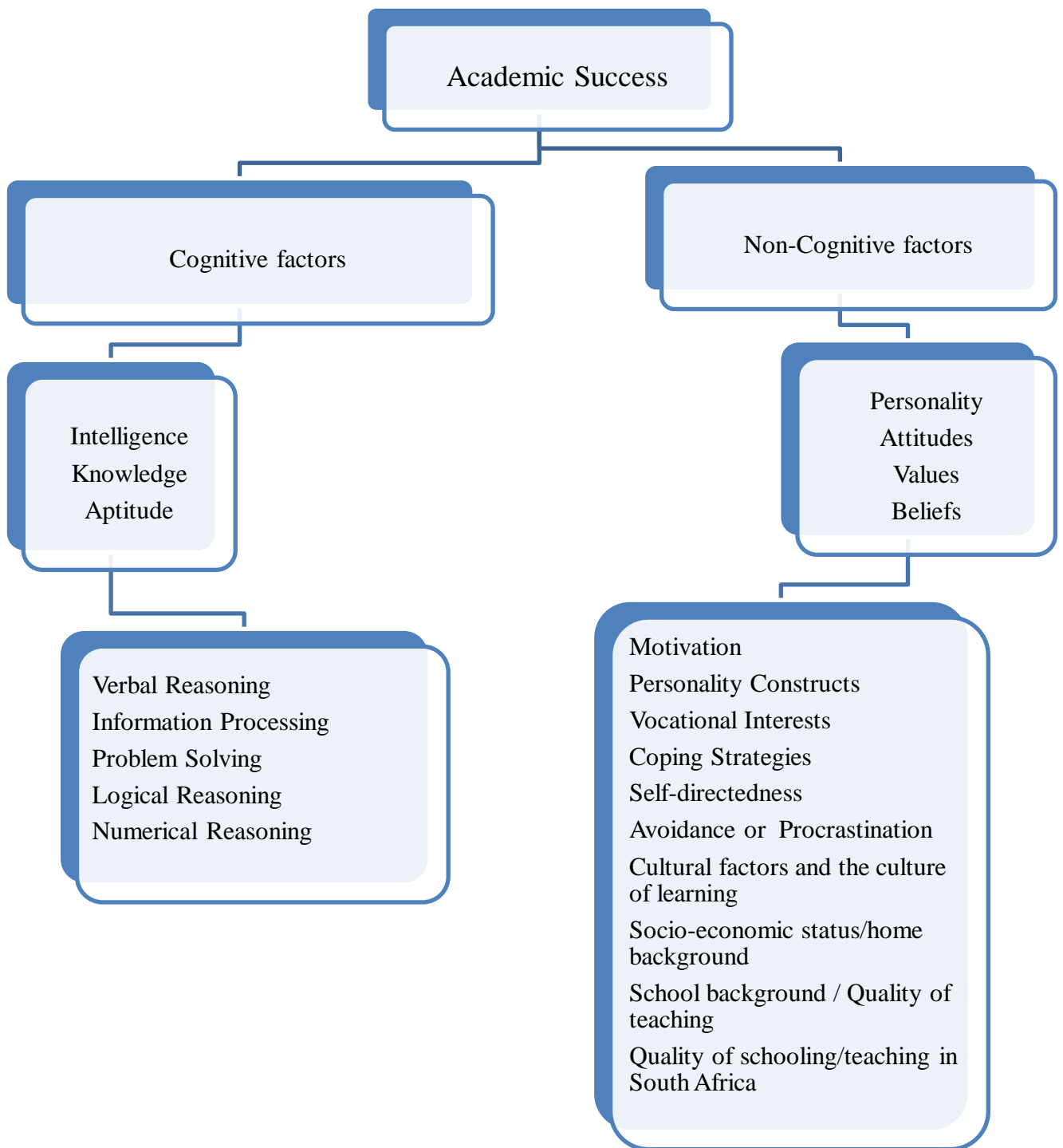
In the previous chapter, an outline of the study was provided. This chapter will provide a theoretical overview of the factors relating to the academic success of first year students in general, with specific reference to FET Colleges.

Cognitive factors such as intelligence, aptitude and knowledge and non-cognitive factors such as motivation, personality and self-concept, among others will be discussed. The relationship between these factors and academic performance will be explored in this chapter.

## **2.2 Factors relating to academic achievement**

Academic achievement is influenced by cognitive and non-cognitive factors (De Raad & Schouwenburg, 1996:304). Knowledge, intelligence and aptitude are cognitive factors that influence learning and academic achievement. Non-cognitive factors are factors such as motivation, interest, coping strategies, creativity and values, as well as a number of demographical factors such as age and type of school attended (De Raad & Schouwenburg, 1996:305). Non-cognitive factors are significant to the degree that they contribute to the probability of academic success in a certain learning environment (De Raad & Schouwenburg, 1996:305). The different factors that relate to academic achievement are summarised in Figure 2.1 below. This summary will be used as the point of departure for this chapter.

**Figure 2.1: Cognitive and non-cognitive factors that relate to academic achievement.**



### 2.2.1 Cognitive / Intellectual factors

Cognitive functioning denotes how the student’s mind works – how quickly or slowly he picks up information, how he thinks, how he goes about solving problems, how intelligent he is. This information about the cognitive functioning of the student should include both

objective and subjective information to provide the clearest picture of functioning (Rogers, 2002:49). Tests of cognitive ability measure mostly the products of prior learning (De Beer, 2005:719).

Cognitive learning strategies play a critical role in proficiency and thought processes, in that it assists with the acquisition and conceptualisation of information through processes involving the identification, attainment and understanding of new information. Cognitive learning strategies are significant to the learning process, as they influence the manner in which the student behaves in the learning environment, particularly in relation to attention to and, managing of information, as well as developing mechanisms for resolving problems. Within the domain of cognitive processes, various learning strategies such as study skills, time management, note taking and test taking strategies have been recognised and examined.

### *2.2.1.1 Intelligence*

Intelligence refers to cognitive abilities present in the individual (Cohen & Swerdlik, 2009:301). Intelligence is considered a relative stable feature that does not digress widely through the lifespan of the individual, while aptitude develops and changes when utilised in certain areas of achievement and opportunities for learning (Cohen & Swerdlik, 2009:301). Most people have an idea of intelligence and intelligent behaviour, but do not refer to a single known definition of intelligence. However, there are theories and approaches that try to describe and even try to define intelligence. Psychometric definitions of intelligence focus on what the test taker knows, rather than on the processes through which this knowledge is acquired, stored and manipulated in problem-solving (Cockcroft & Israel, 2009:354).

Subsequently a number of known definitions of intelligence will be proposed:

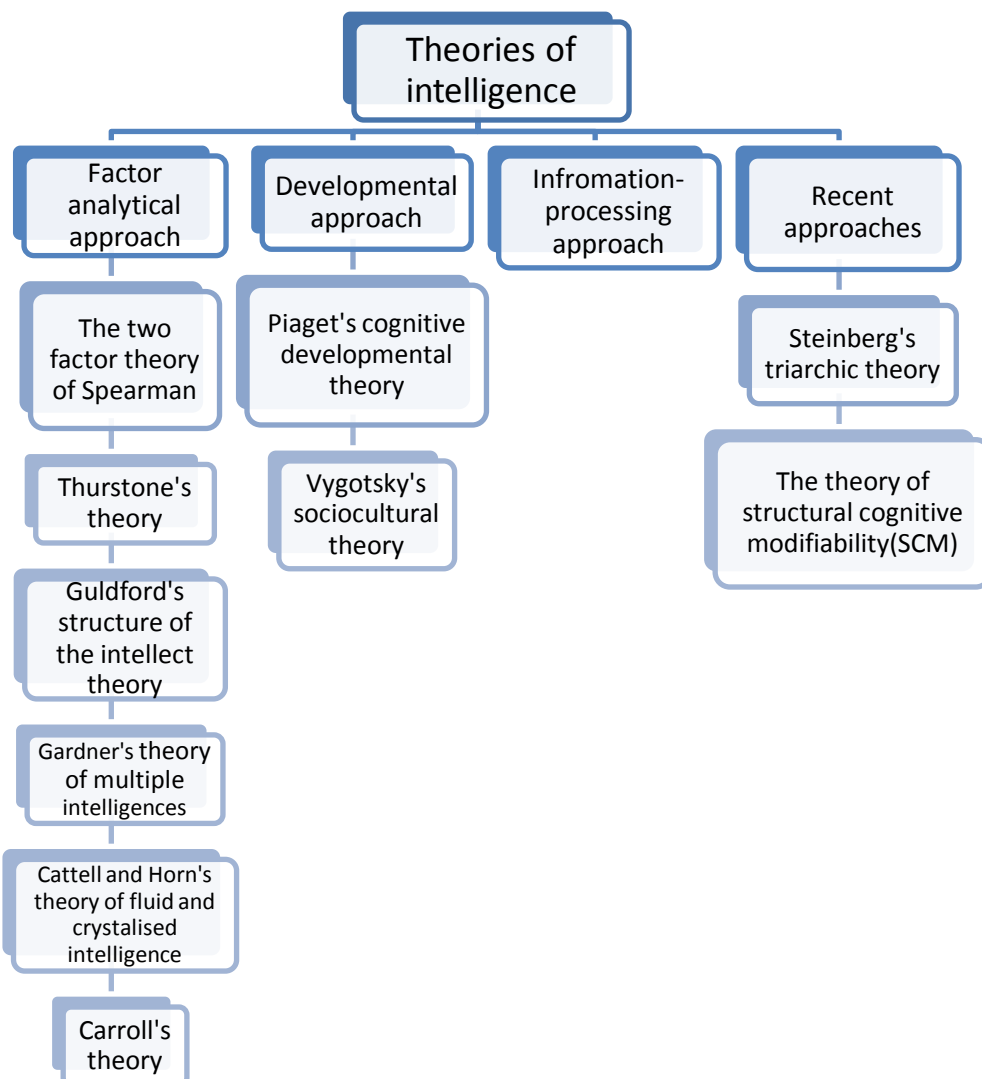
- Intelligence is a general mental potential that among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience – it reflects a more extensive and deeper aptitude for understanding our environment (Deary, 2001:17).

- Intelligence is the ability to take on activities that are characterised by difficulty, complexity, abstractness, economy, adapting to a goal, social value and the emergence of originals (the capacity for the discovery of something new). These activities need to be maintained under conditions that demand a concentration of energy and a resistance to emotional forces that result in the processing of acquiring, storing, in memory, retrieving, combining, comparing and using new content information and conceptual skills (Stoddard, 2008:4).
- Binet, one of the developers of the Stanford-Binet Intelligence Test, defined intelligence as the capacity to find and maintain a definite direction or purpose, to make required adjustments – that is strategy adjustments – to achieve that purpose, and to engage in self-criticism so that necessary changes in strategy can be made (Kaplan & Saccuzzo, 2008:232).
- Robert Sternberg defines intelligence as a mental activity aimed at the purposive adjustment to, and selection and shaping of real-world situations relevant to one's life (Cockcroft & Israel, 2009:354). Sternberg's triarchic theory proposes three components of intelligence. The first component relates to the internal world of the individual and specifies the cognitive mechanisms that result in intelligent behaviour and are concerned with information processing. The second component refers to learning how to do things and is concerned with the way people deal with novel tasks and the development of routine responses for well-practised tasks, and the third component is concerned with practical intelligence (Weiner & Craighead, 2010:836).
- The West place more emphasis on cognitive competencies such as attention, speed of learning, logical reasoning and language comprehension (Nui & Brass, 2011:640)
- The Chinese define an intelligent person as one that has good cognitive competence, a curious mind, a thirst for knowledge, a wide range of knowledge and a good memory (Nui & Brass, 2011:640).
- In India, people's intelligence is evaluated by how sensitive they are to the social context and whether they are in the possession of qualities such as chivalry, morality and righteousness (Nui & Brass, 2011:641).

Although intelligence is defined and viewed differently by people from different parts of the world, these differences contemplate time-honoured cultural traditions and reflect the multifaceted nature of intelligence.

In an attempt to describe the character of intelligence, four basic approaches to assessment have been used. The first approach is the factor analytical approach where underlying relationships between sets of intelligence variables are measured. The second approach is the developmental approach where the increase in the complexity of cognitive functioning is described. The third approach is information processing where the focus falls on how effective the intake, processing and output of information occurs, and the fourth is the recent approaches. The different theories on intelligence are summarised by the author and displayed in Figure 2.2 below.

**Figure 2.2: Theories of Intelligence**



#### 2.2.1.1.1 Factor analytical approach to intelligence

Factor analysis is a method of finding the minimum number of characteristics to account for a large number of variables (Kaplan & Saccuzzo, 2008:19). This approach attempts to measure performance along dimensions that comprise the fundamental structure of the psychological domain, and include among others, cognition, personality and interest (Taylor, 1994).

There is little doubt that intelligence is a meaningful concept (Eysenck & Fulker, 2007:5). Charles Spearman investigated the question whether intelligence is a single ability or the result of the interaction between specialised abilities (Gregory, 2007:26). Spearman was the first researcher to use the factor analytical method to identify underlying structures in the cognitive domain (Taylor, 1994). Spearman's original factor 'g' seemed to correspond to almost any set of mental tests and exhibited positive inter-correlations (Carroll, 1982:38). The reduction of intelligence to two factors, 'g' (general) that underlies performance on all cognitive tasks and a number of 's' (specific) factors that contribute to performance on certain activities, shaped the basis of Spearman's two-factor theory (Spearman, 2008:82, Taylor:1994).

Louis Thurstone developed the method of multiple factor analysis to determine independent factors present in a matrix of correlations (Brody, 2000:20). In order to map the structure of intellect, he used a battery of 57 tests on a sample of students (Taylor 1994). Thurstone's analysis recognised between seven and nine primary mental abilities such as numeric ability, verbal ability and spatial ability (Taylor, 1994). Thurstone laid the foundation for a nonphysical measuring system: an objective structure in which to perform scientific thinking (Bezruczko, 2000:10).

Guilford argued against the concept of a single general intelligence and instead posted 180 distinct intellectual abilities representing the structure of intellect (Brody, 1992:34). He organised the factors along three dimensions, (operation, content and product). Intelligence is seen as comprising of abilities that are grouped according to the different kinds of mental processes used, types of information involved and the form of information processed (Brody, 1992:34). The three different dimensions are used to describe different kinds of intellectual thinking.

The key tenets of Gardner's conceptions of intelligence are not a single personal power that operates with equal effectiveness in all aspects of life, but rather an ability that contributes to the adequacy of a person's performance in life's endeavours (Gardner, 1993:63). Gardner proposed nine separate kinds of intelligences comprising linguistic, logical-mathematical, spatial, musical, bodily-kinaesthetic, interpersonal, intrapersonal, naturalistic and existential intelligence domains (Weiner & Craighead, 2010: 836). Gardner emphasised the separateness of the various aspects of intelligence and used neurological evidence to support the existence of separate intelligences (Sternberg & Mio, 2009:555).

Cattell invented the term *Mental Test* and was convinced that psychophysical methods, objectively measured variations in mental processes (Godin, 2007:699).

Cattell believed that research will reject the idea of a unitary definition of intelligence but also believed that the numerous primary mental abilities identified by factor-analytical studies can be combined into more all-inclusive structures (Jonassen & Grabowski, 1993:53). One of the best theoretical positions he offered as result of factor analysis of the primary mental abilities, was a higher order theory, which distinguished two forms of intelligence, fluid ( $G_f$ ) and crystallised ( $G_c$ ) intelligence (Carroll, 1982:75, Jonassen & Grabowski, 1993:53, Kaufman & Lichtenberger, 2006:522, Tucker, 2009:51, Taylor, 1994). Fluid intelligence is a basic inherited capacity that is developed by an interaction with environmental characteristics that are found in any society; whereas crystallised intelligence are specialised skills and knowledge required in a given culture and accumulated throughout life (Clauss-Ehlers, 2009:546, Taylor, 1994). Positive features of the Cattell model are the cross-cultural validity and its compliance with dynamic learning and developmental interpretations (Sternberg, 1990:95, Taylor, 1994). Pioneers such as Cattell, showed that it is possible to expose the mind to scientific scrutiny and measurement (Gregory, 2007:5).

Carroll's hierarchical model of intelligence was developed in the course of a major survey on the nature, identification and structure of human cognitive abilities (Carroll, 2005:69). The tree-stratum theory postulates that most factors of interest can be classified at a certain stratum with the general factor ( $g$ ) at the highest stratum (Carroll, 2005:71, Kaufman & Lichtenberger, 2006:372, McGrew, 2005:143). The second stratum is made

up of broad factors, i.e. fluid intelligence, crystallised intelligence, general memory and learning, broad visual perception, broad auditory perception, broad retrieval ability, broad cognitive and processing speed (Carroll, 2005:71). Carroll has provided the field of intelligence with a general set of conditions and classifications (Kaufman & Lichtenberger, 2006:566).

Most test constructions lean towards a Thurstonian model (Taylor, 1994). If one looks at the tests available in South Africa, there are several instruments that measure constructs which are closely connected to Thurstone's primary mental abilities (Taylor, 1994). The majority of these tests would be classified as measures of crystallised abilities, and are therefore strongly affected by cultural influences and schooling as certain cultural groups have had more opportunities to develop specific skills (Taylor, 1994). When using measures in a multicultural context such as South Africa, the meaning of the test scores in the different cultures is dealt with under the rubric of comparability or partiality (Taylor, 1994). There are three types of comparability: construct, score and prediction (Taylor, 1994). The fundamental concern when making comparisons about dimensions or constructs is the unavailability of adequate comparability research studies undertaken in South Africa (Taylor, 1994). However, conventional tests have economic utility and until new ways of using scores, separate norms and alternatives become available, these tests will continue to be used (Taylor, 1994).

#### 2.2.1.1.2 Developmental approach to intelligence/cognition

Human cognition refers to the inner processes and products of the mind that become increasingly complex as a person grows from infancy to adulthood (Donald *et al.*, 2006:50). Two developmental theories will be discussed here – Piaget's cognitive-developmental stage theory and Vygotsky's socio-cultural theory.

Piaget conceptualised the child's understanding of the world at any given developmental period as being represented by mental structures or schemes (Cohen & Swerdlik, 2009:228). He saw people as actively engaged in an ongoing process of adaptation through several main periods of development from birth to adolescence (Donald *et al.*, 2006:51, Eysenck & Fulker, 2007:195). Piaget defined intelligence as a cognitively driven process of assimilation and adaptation to the environment and suggested that this

happens through three interacting processes: assimilation, accommodation and equilibrium (Donald *et al.*, 2006:52, Cohen & Swerdlik, 2009:228).

Piaget's theory has been criticised in that the development of cognition in children is heavily dependent on the social context in which a child develops, as well as the influence that experiences and education has on the child's progression (Donald *et al.*, 2006:57, Eysenck & Fulker, 2007:198).

Vygotsky believed that children are active learners in their environment, but emphasised the importance of the social environment in their learning (Donald *et al.*, 2006:57). He further postulated that being products of human culture, psychological tools should be taught to children through their interpersonal interaction with adults (Karpov, 2005:19). The second component in the mastery of these tools, according to Vygotsky, is the internalisation of the tools (Karpov, 2005:20, Donald *et al.*, 2006:57).

Piaget and Vygotsky, perhaps the most notable developmental psychologists of the twentieth century, concluded that the higher order of intelligence includes the ability to anticipate and reflect on one's own behaviour, a concept now called metacognition (Ryan, 2010:105). Metacognition is the ability to think about one's own thinking and the thinking of others (Ryan, 2010:105).

#### 2.2.1.1.3 Information-processing approaches to intelligence

Information-processing theories of intelligence hold opposing views primarily in relation to the level of information processing that they emphasise (Sternberg, 1987:166). Information processing as an analysis of human performance, proposes a distinguished view of individual differences in cognitive aptitude and competencies (Corr, 2010:4). The components of information-processing are applied to tasks and situations where some level of prior experience has been acquired (Sternberg, 1987:154). Distinctiveness in cognition has been understood in terms of general intelligence as a wide-ranging factor of cognitive aptitude (Corr, 2010:4). This definition of cognition has two elements: (1) the content of cognition consists of mental representations and (2) the activity of cognition involves cognitive processes (Weiner & Craighead, 2010:816).

Various researchers have tried to find intelligence among information-processing tasks seeking to establish reliable and meaningful associations between individual differences to basic information processing tasks and the measures of intellectual ability (Galotti, 2010:23). Several of these investigations failed to establish even minimal correlations among the broad measures of intellectual ability in normal populations (Sternberg, 1987:150).

Concurrent to the computer metaphor, information-processing theorists assume that people, like computers, can perform cognitive acts by applying only a few intellectual operations to symbols (Galotti, 2010:23). The information-processing tradition is rooted in structuralism since individual and developmental differences relate to differences between basic capacities and processes (Galotti 2010:24).

#### 2.2.1.1.4 Recent approaches to intelligence

Both Sternberg and Gardner view intelligence as a number of domains that represent the individual's interaction with the environment and cultural context (Weiner & Craighead, 2010:836).

Sternberg and Mio (2009:555) defined intelligence through a triarchic theory of human intelligence and posited that the nature of intelligence consists of more than Spearman's *g* (general factor). Sternberg has adopted a systems approach and hypothesised that intelligence can be divided into three distinct, yet interrelated aspects: (1) the internal world of the person (2) experience and (3) the external world (Sternberg & Mio, 2009:555). The **internal part** of the theory consists of three components, analytical intelligence, creative intelligence and practical intelligence, and although theoretically distinct from one another, they all make use of the same underlying set of information-processing abilities (Clauss-Ehlers, 2009:546, Sternberg & Mio, 2009:555). All three component processes contribute to aspects of intelligence: analytical, practical and creative intelligence (Weiten, 2007:384).

Analytical intelligence refers to the solving of familiar problems by using executive processes, knowledge and performance (e.g. analysing and comparing). Creative intelligence solves problems that are novel and their elements require the use of new

and innovative tactics, (e.g. inventing and designing), whereas practical intelligence is demonstrated by real-world environments where ordinary problems are solved through the application of known strategies, e.g. application and usage (Sternberg & Mio, 2009:556, Weiten, 2007:384). These components are interdependent (Sternberg & Mio, 2009:556). This theory also considers how **experience** may interrelate with all three kinds of information-processing components (Sternberg & Mio, 2009:556).

Feuerstein's approach to dynamic assessment is based on the assumption that individuals have the ability and capacity to modify and adapt their cognitive functions to the changes and demands of life situations (Tzuriel & Haywood, 1992:9). According to the theory of Structural Cognitive Modifiability (SCM), individual cognitive ability are not fixed traits, but can be developed into a variety of ways in the presence and quality of appropriate forms of interaction and instruction (Poehner, 2008:53).

The shift from analysing human capabilities with an active-modification approach rather than a passive-recipient approach requires a change of conception of human capabilities from immutable to plastic and modifiable (Tzuriel & Haywood, 1992:27). The change from a model of stability to a model of change blends with holistic and operational assessment models (Tzuriel & Haywood, 1992:28).

#### *2.2.1.2 Aptitude*

Intelligence is considered a relative stable feature that does not digress widely throughout the lifespan of the individual, while aptitude develops and changes when utilised in certain areas of achievement and opportunities for learning (Cohen & Swerdlik, 2009:301).

Aptitude refers to the potential for learning or acquiring a specific skill (Kaplan & Saccuzzo, 2008:7). Aptitude can also be described in terms of the inborn and acquired primary mental abilities that an individual might have at any stage, which enables him/her to develop capabilities and skills successfully (Jensen, 1992:275.).

Aptitude tests attempt to evaluate a student's potential for learning rather than how much a student has already learned and therefore evaluates the effect of unknown and

uncontrolled experiences in order to predict future performance (Kaplan & Saccuzzo, 2008:309). Aptitude therefore, refers to a supply of information and skills acquired over time.

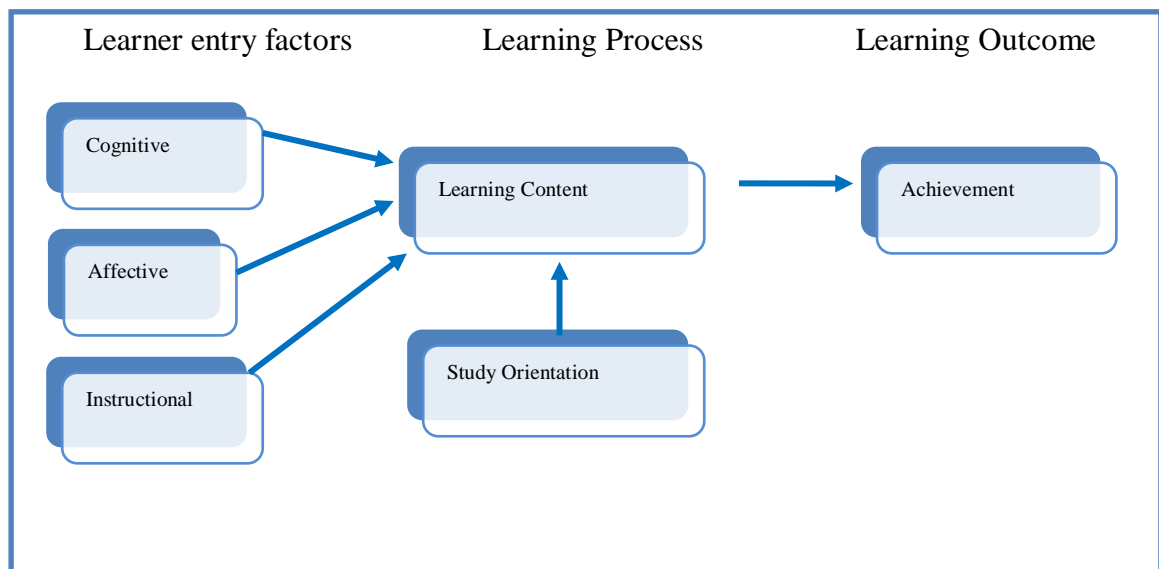
### 2.2.1.3 Knowledge

An individual's knowledge base consists of knowledge that is both formally and informally acquired (Buehl & Alexander, 2001:388). A student's epistemological belief about knowledge, that is their belief about the nature of knowledge, plays an influential role in the learning process, academic performance and knowledge acquisition (Buehl & Alexander, 2001: 400, Buehl *et al.*, 2002:415). Academic knowledge is typically acquired in the context of a school environment (Buehl & Alexander, 2001:389).

#### 2.2.1.3.1 Learning

Academic demands of the students, which range from knowledge to evaluation, are defined by their level of understanding of the course content (Nordvall & Baxton, 1996:486). The level of understanding of the course content can be established by applying a scheme such as Bloom's taxonomy of educational objectives (Nordvall & Braxton, 1996:486). Bloom (1976:10) identified the three main factors related to academic achievement (see Figure 2.3 below):

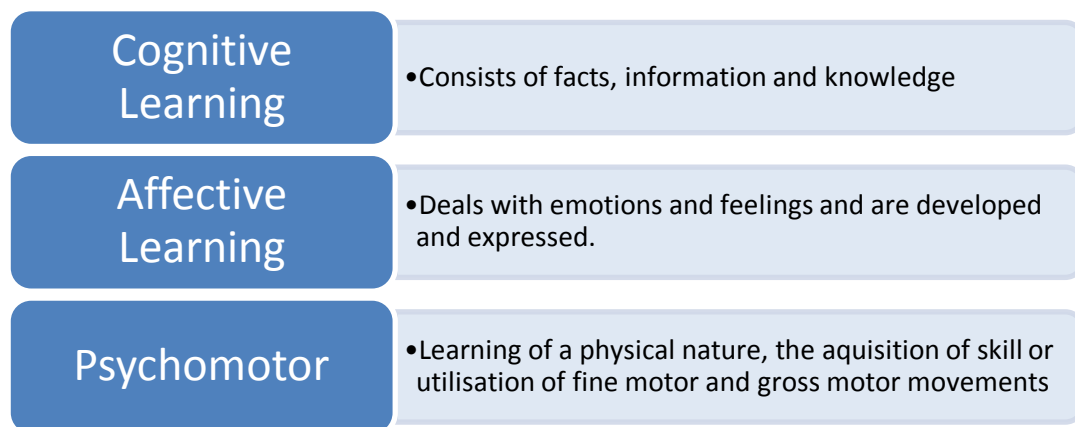
**Figure 2.3: Bloom's Model of Learning**



- Cognitive factors, e.g. intelligence, aptitude and thoughts about a learning task;
- Affective factors, e.g. motivation, self-concept and the interest with which the learner approaches a task; and
- Quality of instruction, e.g. good explanation, participation in the learning task, application of the subject content and test taking strategies.

Cognitive and affective variables are entry factors that lie within the learner and precede the learning process, e.g. verbal reasoning, information processing and problem solving abilities. A factor that is situated outside the learner is quality of instruction and varies from teacher to teacher. It is important to note the difference between academic ability (cognitive phenomenon) and academic performance (measure of success in the academic task undertaken) (Jensen, 1981:2). According to Kaufhold (2002:4), learning means different things to different people. Thus, learning can be explained by referring to the domains of learning as depicted in Figure 2.5:

**Figure 2.4: Domains of Learning**



Cognitive processing activities are those thinking activities that students use to process subject matter and that lead directly to the learning outcomes (Vermunt & Verloop, 1999:259). Affective learning activities are those that students use to cope with emotions that start during the learning process and which might lead to a frame of mind that impair learning (Vermunt & Verloop, 1999: 259). Meta-cognitive regulation activities are those that students use to decide on the learning content and use to control the processing and affective activities (Vermunt & Verloop, 1999:259).

The categorisation of the learning activities are summarised in Table 2.1 (Vermunt & Verloop, 1999:259):

**Table 2.1: Categorisation of learning activities**

<b>Cognitive</b>	<b>Affective</b>	<b>Regulative</b>
Relating/structure	Motivating/expecting	Orienting/planning
Analysing	Concentrating/exerting effort	Monitoring/testing/diagnosing
Concretising/applying	Attributing/ judging oneself	Adjusting
Memorising/rehearsing	Appraising	Evaluating/reflecting
Critical processing	Dealing with emotions	
Selecting		

Learning can also be described as a mental activity that includes receiving, storing, retrieving and using knowledge that require interest and often demand effort (Boulton-Lewis, 1998:14). The researcher Benjamin Bloom categorised and organised learning into six levels which he called the taxonomy of learning and listed learning from the lowest to the highest form (Kaufhold, 20025). The levels of learning can be seen in Figure 2.5.

**Figure 2.5: Bloom’s Taxonomy of Learning**

<b>Higher levels of learning</b>	<p><b>Evaluation</b> (to make judgments about knowledge)</p>	<p>At the evaluation level, the highest level according to Bloom, the students bring previous levels of learning to the tasks to prepare judgments about subject material.</p> <p>Interpret, justify, decide, criticise, judge, solve, rate, assess, appraise</p>
	<p><b>Synthesis</b> (to create new ideas or things)</p>	<p>This level requires the presentation of conceptual ideas on the part of the student - Hypothesise, predict, create, invent, produce, modify, extend, design, formulate, develop, build, compile</p>
	<p><b>Analysis</b> (to take information apart)</p>	<p>Learning at this level involves breaking down the subject. A play or story could be analysed to present an original idea - Study, combine, separate, categorise, detect, examine, inspect, discriminate, take apart, generalise, compare, analyse, scrutinise</p>

Lower levels of learning

<b>Application</b> (to use information)	At this point the learner is asked to put the knowledge and understanding to use in order to solve a problem or exercise - Try, diagram, perform, make a chart, put into action, build, report, employ, relate, draw, construct, adapt
<b>Comprehension</b> (to understand information)	Comprehension involves the task of understanding the information so that it can be used in future. It entails the restating of information - Summarise, relate, experiment, simple comparisons, demonstrate, explain, reword, discuss
<b>Knowledge</b> (to find or remember information)	Knowledge is defined as the acquisition of facts or information. Most of the learning at this level is rote learning - Tell, uncover, show, list, locate, repeat, define, explain, investigate, recall, name, point to

It is important to take note that learning does not take place in a linear fashion and with a few exceptions, most students in twelve years of schooling, only get to the first two levels – knowledge and comprehension (Kaufhold, 2002:8). Bloom’s taxonomy provides a detailed vocabulary for defining academic quality (Nordvall & Baxton, 1996:486). This well-know taxonomy comprises six major categories: knowledge, comprehension, application, analysis, synthesis and evaluation (Nordvall & Braxton, 1996:486). These categories present a hierarchy of increasing levels of understanding (Nordvall & Braxton, 1996:486). The descriptions of the six major categories of Bloom’s Taxonomy of the Cognitive Domain are as follows according to Nordvall and Baxton (1996:495):

1. Knowledge – This level of understanding is characterised by recollection of the course content, either through recognition or through recollection.
2. Comprehension – This level of understanding is categorised as the ability to understand the meaning of the course content. This ability of the student is evident in the student’s ability to (1) transform material from one form to another (2) explain or summarise the course content, and (3) predict outcomes or results from course material.

3. Application – The ability to use or apply course content to real situations, where solutions are not specified or to situations not yet met in the course are epitomised on this level of understanding.
4. Analysis – This level of understanding represents the ability to subdivide course content as well as to distinguish between the organisation and the association of the parts.
5. Synthesis - This level of understanding is characterised by the capacity to assemble content to create a pattern or structure not apparent in the existing course content.
6. Evaluation – This level of understanding requires the use of internal or external principles to assess the significance of the course content.

#### 2.2.1.3.2 Learning potential

The multifaceted South African context dictates the use of procedures and tests that take the range of examinees into account. The emphasis should be on the measurement of crystallised competencies that are mainly the result of learning opportunities, rather than towards the measurement of fluid ability – in particular undeveloped potential – which will allow for restoring of past inequality (De Beer, :2005:718). Both the initial level of performance and improvement should be taken into account to provide a fair and equitable description of likely future performance (De Beer, 2005:722).

In South Africa, there has been a gap in the distribution of opportunity and it is fitting to differentiate between learning performance and learning potential at this point (Taylor, 1994). Learning performance is demonstrated when a student obtains specialised skills through transfer from other skills or abilities. The more complicated and developed a person's skill collection the more effectively the new ability will be obtained (Taylor, 1994). Learning potential is shown when a student is faced with a novel-learning task involving unfamiliar stimulus material (Taylor, 1994). Learning potential is subsequently defined as 1) the inverse of the number of hints necessary to reach a specified amount of learning and 2) the test scores after training is also considered as measures of learning (Resing, 1992:221). The use of dynamic (teach-test-retest) assessment of learning acknowledge the differences with which the examinees come to a testing situation and

with the assumption that examinees approach real life learning opportunities in a similar way (De Beer, 2005:723).

The amount of help a student needs and the extent to which a student profits from the instruction by an adult depend on the Zone of Proximal Development (ZPD) (Resing, 1992:220). According to Vygotsky, the ZPD is that critical space between the familiar (what a person knows) and the unfamiliar (Donald *et al.*, 2006:59). The process of understanding new ideas happens in that critical space of potential development, through mediation or interaction by a teacher, mediator, parent, when connections between the familiar and the unfamiliar, are made (Donald *et al.*, 2006:59). Learning potential assessment involves the initial measurement of a child's competence (Resing, 1992:220). Students with a broad ZPD profit more from intervention and need less assistance than students with narrow zones profit (Resing, 1992:220, Taylor, 1994).

Taylor (1994) affirms that the two types of learning potential, i.e. type 1 which can be actualized through extensive mediation and the teaching of thinking skills; and type 2 which is revealed in performance on tests that measure learning, either as a result of repeated exposure, is equivalent. The emphasis is therefore on the use of general intellectual ability, (g), to solve problems as opposed to specialized problem solving abilities developed as part of mediation (Taylor, 1994).

#### *2.2.1.4 Other cognitive abilities*

Cognitive functioning denotes how the student's mind works – how quickly or slowly he/she picks up information, how he/she thinks, how he/she goes about solving problems, how intelligent he/she is. As far as information is concerned, both objective and subjective information are involved (Rogers, 2002:49). Cognitive functioning and information relevant to instruction would provide information that teachers need in order to achieve educational goals (Tissink *et al.*, 1992:243). The tests of cognitive ability measure mostly the products of prior learning (De Beer, 2005:719).

Cognitive learning strategies play a critical role with proficiency and thought processes, in that they assist in the acquisition and conceptualisation of information through processes involving the identification, attainment and understanding of new information.

Cognitive learning strategies are significant to the learning process as they influence the manner in which the student behaves in the learning environment, particularly in relation to giving attention, managing information and developing mechanisms for resolving problems. Within the domain of cognitive processes, various learning strategies have been recognised and examined.

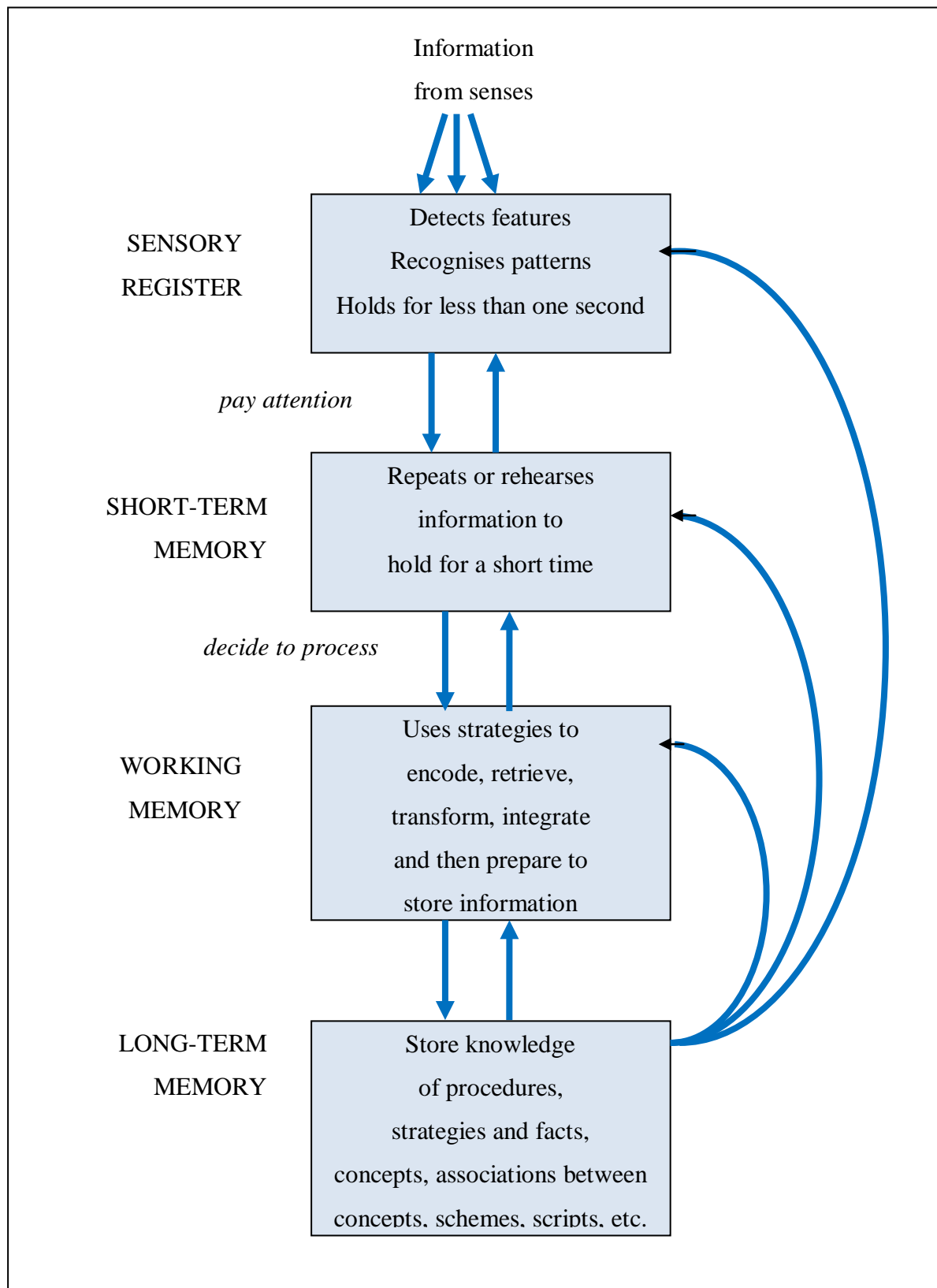
#### 2.2.1.4.1 Information processing

The first factor that relates to academic success is *information processing*. Information processing is a cognitive process and refers to how knowledge is acquired and organised by the use of elaboration and organisation strategies. These strategies help to build bridges between prior knowledge, experiences, attitudes and beliefs, and new knowledge (Weinstein & Palmer, 2002:10).

Academic learning as a component of education is also part of the process of information processing in which perception; memory and thinking are involved (De Raad & Schouwenburg, 1996:306). Students need to build knowledge that is interconnected in order to explain concepts in current material through connections with previous knowledge (McNamara, 2010:340). These connections are made between aspects of memory (i.e. short-term memory, working memory, long-term memory, knowledge and semantic networks) and the strategies that are used to detect and recognise information, retain it for processing, encoding, transforming and storing in the long-term memory (Boulton-Lewis, 1998:14).

As can be seen from Figure 2.6 (next page), the *sensory register* is where a person detects features and recognises patterns of objects or events in the environment; it does not change much with age; and is present soon after birth for most senses (Boulton-Lewis, 1998:16).

**Figure 2.6: Information Processing Model of Memory**



In the *short-term memory* a person hold information for a short time unless he/she uses strategies to keep it there (Boulton-Lewis, 1998:16). It is proposed that an adult can hold five to nine items in this memory due to the increase in speed of processing information and not due to some biological growth in capacity over time (Boulton-Lewis, 1998:16).

The *working memory* is described as the component of the memory where a person combines information from the long-term memory and the short-term memory by using strategies such as encoding, retrieval and integration to process information for storage to, and retrieval from, the long-term memory (Boulton-Lewis, 1998:16).

The *long-term memory* contains almost everything that a person knows; this includes procedural knowledge (knowing how to do things) and declarative knowledge (acquisition of facts, concepts, associations between concepts, schemas and scripts) (Boulton-Lewis, 1998:17).

The study of information processing has led to insights in the teaching of critical subject matter (Weiner & Craighead, 2010:546). The lecture or text challenge the student to generate inferences to bridge conceptual gaps which results in a deeper understanding of the material (McNamara, 2010:340).

#### 2.2.1.4.2 Selection of main ideas

Effective and efficient studying requires that the student is able to select the important material from the supporting detail, i.e. whether the student can identify the key points in a lecture or decide what is important to underline in a textbook (Weinstein & Palmer, 2002:11). According to Weinstein and Palmer (2002:13), if the student is unable to master this skill in time, he or she will experience great difficulty in trying to analyse and learn information for examinations. One way of being able to practise this strategy is by outlining significant information such as definitions, concepts and themes of content from various study aids (a learning strategy that will be discussed next) as well as being autonomous in their learning environment (Weinstein & Palmer, 2002:12).

Studies done by Kirby *et al.* (2008:92) showed that selecting main ideas is positively associated with reading rate and comprehension and could account for the weaknesses in main ideas selection among students who have learning disabilities such as dyslexia. A wide variety of cognitive activities is included in the *selection of main ideas* and the task indicates whether the student can categorise the main idea in a sentence or title (OECD, 2010:36).

#### 2.2.1.4.3 Test strategies

Over and above the procedures involved in the processing of information as well as the ability to abstract and apply important information from various study aids, it is important that students find means of preparing themselves to report the information learnt. An example of such preparation is through developing test strategies. *Test strategies* include both preparation and test-taking strategies. These strategies consist of knowledge about the characteristics of tests and test items, how to create a test-taking plan as well as knowing methods for studying and learning the material in order to use it at a later stage (Weinstein & Palmer, 2002:13, Hartman & Stewart, 2009:96-108). Test taking skills comprise of the decoding of the information, remembering the material, communicating, and organising the information in a reasoned manner at the time of the assessment (Abreu-Ellis *et al.*, 2009:35).

Preparing for a test is often complex, due to the students' difficulty with organisation, comprehension, memory, and task completion within time limits, self-doubt and test-wiseness (Reid & Lienemann, 2006:202). Students who are able to do better than others from the same ability level are called test-wise (Dodeen, 2008:410). Test-wiseness use one or any combination of the following components: use of time, error avoidance, guessing, deductive reasoning, answer analogies and the answer of multiple-choice questions (Ritter & Idol-Maestas, 1986:351).

Test-taking strategies are cognitive abilities that assist the student to take any test in any situation, in a suitable manner and to recognise what to do before, during and after the test (Dodeen, 2008:410). It is proposed that test-taking strategies are as important as having the knowledge to answer the test questions (Dodeen, 2008:410). It is further proposed that

students with test-taking strategies have improved attitudes towards tests, have lower levels of anxiety and achieve better grades (Dodeen, 2008:410).

To study for any kind of test, students need to start in advance, collecting and organising all materials (Flippo, 2008:46). Flippo (2008:1) further proposes that for any student to be successful, he/she must know how to:

1. Get in the right frame of mind to take the test;
2. Use all available resources to study for tests;
3. Anticipate the right answers for each test;
4. Practise answering those questions before taking the test;
5. Recognise the indications or clues given in the test; and
6. Use strategies correctly to answer as many questions as possible in the time allotted for the test.

Test preparation involves coordination of study skills i.e. organisation, time management, note taking and memorisation, and the use of these strategies enables students to do better (Flippo, 2008:1).

### **2.2.2 Non-cognitive factors that relate to academic success**

In the debate that centres around the dimensions that should be included in the assessment of educational achievement, increased attention is given to the inclusion of non-cognitive predictors of academic success (Tracey & Sedlacek, 1987:334). Messick has provided a list of non-cognitive variables (Table 2.2 below) that may facilitate learning (De Raad & Schouwenburg, 1996:305).

Weinstein's scale for measuring students' learning behaviours (such as the Learning and Study Strategies Inventory - LASSI) provides a comprehensive instrument for assessing individual learning strategies in order to diagnose the strengths and weaknesses of student learning behaviour (Weinstein & Palmer, 2002:10).

The LASSI-HS is an assessment tool designed to measure a student’s use of learning and study strategies and methods that are vital for academic achievement and which are instrumental for the successful switch from high school to a college setting (Weinstein & Palmer, 2002:5).

**Table 2.2:Non-cognitive variable that facilitate learning**

<b>Variables</b>	<b>Description / Examples</b>
Experiential/background	Work experience, educational history, demographics
Affect	Positive, negative feeling, state (anxiety)
Attitude/belief	Action tendency, orientation to learning/self, locus of control
Interest	Pattern of choice, preferences
Motivation	Need for achievement, need for approval
Curiosity	Exploratory drive
Temperament	Disposition influencing behavioural style
Social sensitivity	Interpersonal competence, empathy, leadership, tolerance
Coping strategy	Meeting requirements of demanding environment
Cognitive style	Information processing consistencies reflecting personality
Creativity	Fostering originality and creative mind in education
Values	Social standards, morality

The self-regulatory component of learning strategies or non-cognitive factors according to Weinstein and Palmer (2002:5) are those strategies that assist students with the management of the learning process to ensure that effective learning can take place. Self-regulatory behaviours play a vital role as it influences the student’s ability to achieve and maintain academic goals and assist largely with the acquisition of skills that are essential to learning (Bembenutty, 2009:139). According to many authors, some of the most commonly examined self-regulatory strategies are self-testing strategies, concentration, time management and the use of study aids which will now be elaborated upon in more detail (Bembenutty, 2009:140, Weinstein & Palmer, 2002:5).

### 2.2.2.1 Personality

FET College role-players have expressed their concerns about the low pass rate and alarming retention and throughput rates of learners in NCV programmes in Levels 2 and 3 since the commencement of these programmes in 2007 (Papier, 2009:5). Although a number of external factors might have contributed to the negative student performance, research done by the Western Cape Education Department (WCED) indicated that there are strong links between student success and personal characteristics (Papier, 2009:11).

Carl Jung, a Swiss psychologist believed that a person is born with a predisposition for certain personality preferences and that healthy development is based on the lifelong nurturing of inborn preferences (Felder *et al.*, 2002:3). Probably the best-known instrument used to assess learning styles is the Myers-Briggs Type Indicator (MBTI), which measures preferences on four scales derived from Jung's Theory of Psychological Types (Felder *et al.*, 2002:4). An individual's type is expressed as one of sixteen possible combinations in terms of their preferences for introversion(I) / extraversion (E); sensing (S) / intuition (N); thinking (T) / feeling (F); and judging (J) / perceiving (P) (Felder *et al.*, 2002:5). The Big Five personality traits of Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness are among the personality traits found to be positive significantly related to course grades (Lounsbury *et al.*, 2003:1232).

Each person is unique, but the general statements made about personality after taking a personality test can provide useful information as to the choice of a college course. To focus on personal strengths can also increase self-esteem and self-confidence, which contribute to success and enjoyment of life (Lounsbury *et al.*, 2003:1233).

### 2.2.2.2 Values

Good character is vital to individual and societal well-being and is what people look for in leaders and in work colleagues (Park, 2009:42). Good character is the nonappearance of deficiency, problems and pathology, as well as a group of well-developed positive features (Park, 2009:42). The Values in Action (VIA) classification of strengths focus on the strengths of character that contribute to optimal development (Park, 2009:43, Gillham *et al.*, 2011:31). Park *et al.* (2004:605) identified ten criteria that a positive trait had to

satisfy to be included in the classification as strength of character. Fulfilling, moral value and measureable is, according to Park *et al.* (2004:605), some of these criteria. Twenty four specific strengths of character have been classified and divided into six core virtues (courage, humanity and love, justice, temperance, transcendence, wisdom and knowledge) that have been proved to be omnipresent across time and culture (Park *et al.*, 2006:119).

Character strengths are embedded in personality traits and are displayed in people's thoughts, emotions, and behaviours (Gillham *et al.*, 2011:31). Temperament and personality styles are not morally valued, but character strengths have had a moral meaning across cultures and throughout history (Gillham *et al.*, 2011:31). Family, community, society, and other contextual factors influence character strengths and these strengths can be taught and achieved through training and guidance (Gillham *et al.*, 2011:32).

Interventions by parents and teachers promote social intelligence and self-regulatory character strengths, and increase the likelihood of students graduating from college (Gillham *et al.*, 2001:32). Similarly, interventions that promote optimism and gratitude reduce and prevent depressive symptoms in students and increase adolescents' satisfaction with life and with school (Gillham *et al.*, 2011:32).

It can be concluded that a good character, is a combination of 1) positive traits, 2) core virtues that are recognised across world cultures, and 3) character strengths that have observable reliability and validity (Park *et al.*, 2006:119).

Deliberate attempts to cultivate a well-balanced student at FET Colleges should include character development, which could inculcate values that are crucial for academic success and overall happiness in life.

### 2.2.2.3 Attitude

Affects, attitude and interests are closely related personality variables of non-cognition (Messick, 1979:284). Attitude is always directed toward a social object and therefore educationally relevant attitudes towards school and motivation for succeeding at school

have a positive impact on the student's persistence when studying (Messick, 1979:285). A positive relationship between school and life-goals promotes good work habits and concentration (Weinstein & Palmer, 2002:9). When students develop a positive attitude or self-confidence, they can be convinced to take part in classroom activities and consequently learning can take place (Abreu-Ellis *et al.*, 2009:34). Motivational components such as attitude and belief are critical to make learning more efficient (Wery & Nietfeld, 2010:72).

Students who have a positive attitude towards learning are likely to be confident and enthusiastic and had developed a better understanding of the link between academic performance and future life goals (Abreu-Ellis *et al.*, 2009:32, Wery & Nietfeld, 2010:72).

Numerous studies indicate that ability, study habits, motivation and test anxiety are related to performance. However, Smith (2002:45) examined the effects of confidence and self-perception of test-taking skills on performance and indicated a positive relationship between confidence and performance. There is sufficient evidence that confidence will have a positive effect on test performance (Smith, 2002:45).

#### 2.2.2.4 *Belief*

Closely related to the concept of attitude is a belief or premise about the nature of the object and its relation to other objects (Messick, 1979:285). A belief may also be defined as the individual's expectancy of a relationship between the object and any other concept, value or goal (Messick, 1979:285). A widely investigated educationally relevant dimension of belief is the locus of control (Messick, 1979:285). The locus of control is a self-attitude attribute that can be conceptualised to the extent to which people think they are fundamentally responsible for what happens in their own lives (Jones, 2009:161). An internal locus of control refers to the belief in personal control and responsibility for one's own life; and an external locus of control refers to the belief that the responsibility for control resides largely with fate, luck or chance, or powerful others (Jones, 2009:161). A person with an internal locus of control expects that his/her actions will be positively reinforced, whereas a person with an external locus of control does not exert personal effort in the service of goals or in its actualisation (Jones, 2009:161).

A study done by Jones (2009:169) indicated that through intervention programmes conducted in a supportive atmosphere participants were encouraged engage in self-exploration. Through the insights that they have gained about themselves the participants displayed significant psychosocial changes in a relatively short period. These changes can also be brought about through student support and intervention programmes at FET Colleges.

#### *2.2.2.5 Other non-cognitive abilities*

##### *2.2.2.5.1 Concentration*

Concentration is students' ability to direct and maintain attention on academic tasks (H & H Publishing Company, 1996-2006, Weinstein & Palmer, 1990:16-17, Weinstein & Palmer, 2002:10). Observations of classrooms confirm that students are faced with a range of distractions even during relatively controlled teacher-led instruction, thus the ability to maintain concentration in the face of obstacles is important in self-regulated learning (Corno, 2007:180).

Concentration is the ability to filter and focus attention, to differentiate between appropriate and inappropriate influences and to avoid averting thoughts (Groccia, 1992:116). To study for short periods, prevents boredom, helps to avoid tiredness and enhance concentration and motivation (Van Blerkom, 2009:92). Van Blerkom (2009:106) further maintains that strategies to improve concentration such as setting realistic goals, and taking breaks help to create a positive learning environment.

##### *2.2.2.5.2 Time management*

Many students have various demands on their time. Knowledge and self-awareness helps them to create workable schedules (Weinstein & Palmer, 2002:13). Time Management is the students' application of time management principles (effective scheduling and monitoring techniques) to assure timely completion of academic tasks and to avoid procrastination while realistically including non-academic activities in their schedule (H & H Publishing Company, 1996-2006, Weinstein & Palmer, 1990:16). Time management

is one of the most effective tools in assisting students to meet their goals (Gardner *et al.*, 2007:16).

Licht and Nash (2009:32) suggest six steps to improve time management skills. These steps are: decide what is worthwhile or valuable; design and set goals consistent with values, but specific enough to be achievable, positive and balanced; identify the specific steps in order to reach the goals – action plan; evaluate how time is spent by using a log to redistribute time on activities; combat procrastination; and get organised.

In summary, the fundamental academic competencies identified in literature that are important for undergraduate success, are being able to think and work autonomously, time management, appropriate study skills and experience in the language of tuition (Jones *et al.*, 2008:44). By using good time management strategies, a student can keep up to date on course assignments and achieve academic success (Van Blerkom, 2009:32).

#### 2.2.2.5.3 Self-testing

Self-Testing is the students' use of reviewing and comprehension monitoring techniques to determine their level of understanding of the information to be learned (H & H Publishing Company, 1996-2006, Weinstein & Palmer, 1990:18-19).

Self-regulated learners use a number of self-testing strategies to evaluate their learning in order to make judgments about how well the performance matched the standard for good work (Van Blerkom, 2009:8). Monitoring strategies such as self-testing are used to deliberately regulate and control learning and assist in integration (Lattuca & Stark, 2009:163). These strategies will also assist in the testing of memory during review sessions or before formal examinations (Van Blerkom, 2009:135).

#### 2.2.2.5.4 Study aids

Study Aids refers to the students' use of material and/or emotional support, as well as other resources to help them learn or retain information (H & H Publishing Company, 1996-2006, Weinstein & Palmer, 1990:18).

Motivational support for learning as well as academic resources at home is some of the study aids that are associated with academic achievement (Christenson & Havsy, 2004:63). Through emotional support, when students feel apprehensive about their own abilities, and the positive encouragement of others (i.e. interested peers, friends, parents, lecturers), students obtain optimistic attitudes toward the completion of academic tasks and become more self-assured about academic achievement (Alvarez & Risko, 2008:201).

Newspapers, books, magazines and access to information technology such as television and the internet, fulfil an important educational function in exposing students to the outside world and to different careers (Jones *et al.*, 2008:11). A lack of exposure to written and spoken English could have a negative impact on a student's proficiency at university (Jones *et al.*, 2008:10). Students should also have safe and accessible residential accommodation where mentoring programmes are implemented in order to assist them to integrate with college life (Jones *et al.*, 2008:91).

Study support encompasses learning activities outside normal instruction which students take part in voluntarily (Andrews, 2001:25). As this is an extension opportunity which add to and support what goes on in the classroom, the support should persuade other role players to participate (Andrews, 2001:25). Access to academic institutions without support is not opportunity (Engstrom & Tinto, 2008:50). Learning environments and study conditions also need to be constructed, because without support or the necessary study aids many students, especially those who are deprived or academically under equipped, are not likely to succeed (Engstrom & Tinto, 2008:50).

#### 2.2.2.5.5 Motivation

Motivation is the degree to which students accept responsibility for studying and performance, and is reflected in everyday behaviour such as reading textbooks, finishing assignments on time, preparing for class and studying, even if the topic is not particularly interesting to them (Weinstein & Palmer, 2002:11). Parents' heightened expectations and value placed on their children's academic success are linked to heightened motivation and achievement among students (Pomerantz *et al.*, 2005:265).

Pintrich (2004:395-396), explains a student's motivational strategy by referring to extrinsic motivation (promising themselves certain positive activities on completing an academic task) and intrinsic motivation (trying to make a task more interesting, relevant or useful to their careers, experiences or lives). Intrinsic motivation, also called "flow", refers to an intense and focused concentration, a merging of action and awareness, a loss of a sense of self and experiencing the activity as intrinsically rewarding (Socha & Yingling, 2010:117). Socha and Yingling (2010:117) further state that moments of flow result from achieving a balance between challenges and skills and when experienced regularly, correlates with a number of positive qualities including academic success.

Motivation is something that revitalises, directs and sustain behaviour toward a specific goal and goes hand in hand with goal setting (Van Blerkom, 2009:9). This type of motivation can also be referred to as performance motivation.

In all these instances, students attempt to change or control their motivation to facilitate the completion of a task that might be uninteresting or complex (Pintrich, 2004:396). Effective learners uphold motivation to complete academic assignments and acquire beneficial motivational beliefs that facilitate their effort over time and when faced with obstacles (Bembenutty, 2009:140).

#### 2.2.2.5.6 Anxiety

Anxiety refers to the degree to which students worry about their academic performance. Cognitive worry is manifested in self-referent statements, which diverts a student's attentions away from the task at hand (Weinstein & Palmer, 2002:9). Test anxiety refers to those phenomenological, physiological and behavioural responses that accompany concerns about possible failure of a test (Gregory, 2007:61). Because test anxiety is one of the most disruptive factors associated with underachievement in students, it has been identified as one of the factors that impair academic performance (Kassim *et al.*, 2007:18).

Additional consequences of chronic test anxiety can include lowered self-esteem, reduced effort and loss of motivation to complete assignments (Huberty, 2010:35). High-stakes testing, as in the case of admission tests to colleges, could lead to failure of certain

sections of the test due to heightened anxiety levels when taking such tests. This could happen despite the fact that students know the material. (Huberty, 2010:36).

High levels of anxiety also interfere with concentration and memory and are closely associated with lowered academic performance and motivation. (Hancock, 2001:288). Test anxiety has been shown to correlate negatively with academic results, aptitude test scores, measures of intelligence and test performance on timed tests (Gregory, 2007:61).

#### 2.2.2.5.7 School education and other factors

The debate about matric is an old one and usually centres around the issues of quality and standards (Ndaba, 2005:30). Matric is per definition, university admission and represents the exit point of school studies (Foxcroft & Stumpf, 2005:10). The quality of the matric examination is important, as it is a sampling of the scholastic achievement of learners (Ndaba, 2005:31). Nevertheless, what is even more important than the results obtained in the final examination is the school's responsibility to deliver students with the necessary knowledge, skills and values to succeed in life, work and further studies (Foxcroft & Stumpf, 2005:11).

The senior certificate is by far the most popular determinant of access to Higher Education and the world of work (Foxcroft & Stumpf, 2005:11). Clusters of competencies required of learners entering higher education institutions, are:

1. Academic competencies, such as knowledge and skills in specific content domains or subjects; academic, mathematical and informational literacies; and communication skills (reading writing and listening).
2. Generic cognitive competencies such as high level thinking skills (analyse, synthesise and evaluate), critical thinking skills and problem-solving skills.
3. Personal competencies and attributes such as team working skills and personal characteristics (Foxcroft & Stumpf, 2005:14).

The standard of school education and high school grades has been proven valuable in predicting academic success. Studies in South Africa on school results have shown that Grade 12 means correlate better with first-year performance than any other psychometric

predictor (Bothma *et al.*, 2004:74). The results of the studies reflect that matriculation performance has adequate predictive validity with the highest correlation in programmes with stringent entrance requirements (Foxcroft & Stumpf, 2005:14). The correlation for diploma students in Engineering is the lowest, as the entrance requirement is a Senior Certificate without matriculation (Foxcroft & Stumpf, 2005:14). However, it is the view of Prof. Jonathan Jansen, Vice-Chancellor of the University of the Free State (2012), that it is extremely difficult to fail Grade 12 in South Africa today. As a result, many universities set their own or participate in other admission examinations to select students (Jansen, 2012). In a situation where there is inequality in the school system, the matric examination cannot be regarded as a neutral measure of the potential to succeed in higher education (Jansen, 2012).

Jansen (2012) concludes that mathematics is the standard for assessing the real meaning of the senior certificate results. Medical schools take the National Benchmark Tests (NBT) very seriously as an additional measure of student knowledge in mathematics and languages (Jansen, 2012). The NBT project is an attempt to provide school and higher education with important information on the skills and abilities of the entering and exiting students' information that does not duplicate, but provides an extra dimension (Yeld, 2005:54). The NBTs focus on academic literacy, quantitative literacy and mathematics and provide a benchmark of the National Senior Certificate (Yeld, 2005:57).

Jansen said that fixing standards of outcomes would have to be accompanied by standards for schools and teacher quality (Gernetzky, 2012). A large percentage of teachers in the final grades of school do not have enough subject knowledge or knowledge of teaching to prepare students adequately for final examinations (Gernetzky, 2012).

According to Tracey and Sedlacek (1987:334-335) the factors that relate to academic success are a positive self-concept; a realistic self-appraisal, especially with respect to academic abilities; understanding of and ability to deal with racism; and the ability to work toward longer-term goals, rather than more immediate, short-term ones. They further emphasise that academic familiarity and successful leadership experience in organised or informal groups and demonstrated community service as indicated by involvement in the local community or church activities prior to college entrance also relate to academic success (Tracey & Sedlacek, 1987:334-335).

### **2.3 Conclusion**

In this chapter various factors were identified and discussed that relate to the academic success of first year student. However, much of the recent literature on academic admission and achievement is located in the field of university education and refers to research that was done abroad.

One of the key factors identified in facilitating student success is correct course selection. This challenge is intensified regarding rural South African students as they have less experience or information about correct subject choices at school and course selection after they have left school.

In the present South African context, there are many discrepancies among the cultural groups in terms of socio-economic and educational opportunities. These factors should be taken in mind when students from disadvantaged schools and communities are admitted to FET Colleges. FET Colleges must offer the necessary support and intervention programmes to disadvantaged students, in order for them to meet the academic demands.

In the next chapter the admission and selection of first year NCV (Level 2) students at FET Colleges and factors that influence their academic success, will be discussed.

# CHAPTER 3. THE ADMISSION AND SELECTION OF FIRST YEAR NATIONAL CERTIFICATE VOCATIONAL (NCV) LEVEL 2 STUDENTS AT FET COLLEGES AND FACTORS THAT COULD INFLUENCE THEIR ACADEMIC SUCCESS.

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## **3.1 Introduction**

Further education and training colleges in South Africa have experienced constant and incessant waves of change since the first FET Act was passed in 1998 (McGrath, 2000:67). In 2002, the 152 technical colleges in South Africa were merged with other technical colleges and colleges of education and/or labour training sites to form 50 new FET Colleges (Department of Education, 2002:15). Although the merger process did not change the distribution of college campuses across the provinces, it changed the composition of the college sector.

This chapter commences with a discussion of the background and aims of the FET Colleges. The contributions made by FET Colleges toward skills development in South Africa, the selection programmes currently employed at FET Colleges and the success thereof will be considered. Various factors that could influence the academic success of FET students will also be identified and discussed.

## **3.2 Background and aims of Further Education and Training (FET) Colleges.**

Public FET Colleges evolved under colonialism and apartheid and reflected the racial politics of those eras with regard to students' access (Akoojee & McGrath, 2007:210). It was not until the Manpower Training Act of 1981 was established that African students were able to become apprentices and, hence, given access to the principal programmes of the technical college sector of South Africa (Akoojee & McGrath, 2007:210).

The 1980s and early 1990's were crisis periods for technical colleges, as transformation in employment and technology resulted in the decline of apprenticeships and an increased disparity between the programmes technical colleges offered and the demands of industry

(McGrath, 2010:526). Legislated racial segregation of the South African system made provision for the development of separate urban institutions for coloureds (Cape Town) and Indians (Durban) however, Africans' access to institutions was limited to the homelands (McGrath, 2010:256).

The unbanning of the African National Congress (ANC) in 1990 led to a period of policy conceptualisation where the future of the technical colleges was discussed as part of the National Policy Initiative (Gewer, 2001:134, McGrath, 2010:526).

A focus on technical colleges was a relatively marginal part of the discussions regarding the South African education and training sector, with questions about both vocationalised schooling and industry training getting more attention from the various constituencies involved (McGrath, 2010:526).

The National Department of Education was responsible for the policies of colleges, but as far as the education and training policy was concerned, the policy development centred around the National Qualifications Framework (NQF) (McGrath, 1998:505). Although the policies of the technical colleges fell under the new unified Department of Education, the South African Qualifications Authority (SAQA) Act (58/1995) clearly organised the programmes of technical colleges under the education and training band alongside the senior grades of secondary schooling and intermediate skills training (Gewer, 2001:137, McGrath, 2010:527). SAQA set the parameters for an education and training pathway model for South Africa, which comprised of three parts (Cosser, 2010a:3).

- Three bands: General Education and Training (GET); Further Education and Training (FET); and Higher Education and Training (HED);
- Eight Levels: Level 1 constituting the GET phase; levels 2-4 constituting the FET phase; and level 5-8 constituting the HED phase; and
- Qualifications within the three bands that articulate with one another: a General Education and Training Certificate (GETC) at the exit point of the GET phase; a Further Education and Training Certificate (FETC) at the exit point of the FET phase (with the achievement of unit standards at National Qualifications Framework {NQF} levels 2 and 3); and certificates, diplomas

and degrees – with notional learning hours of 120, 240 and 360 credits respectively attached to them - in the HED phase (Cosser, 2010a:4).

A major implication of the restructuring of the Department of Education in 2009 to create the Departments of Basic Education and Higher Education and Training (HED) is that FET Colleges now fall under the Higher Education and Training Band (Cosser, 2010c:4). The Department of Basic Education is responsible for the development of the Further Education and Training Band for both high schools and colleges (McGrath, 2010:528).

In 1994, the new South African government inherited 152 technical colleges that reflected the British model of evening classes and block release for apprentices (Gewe, 2001:137, McGrath, 2010:526). Within the context of becoming merged institutions, FET Colleges were also expected to become more responsive to demands of industry and to largely enable self-employment (McGrath, 2003:16).

A number of forces and discourses shaped further education and training in South Africa between 1994 and 2009 (McGrath, 2010:526). FET Colleges have replaced technical colleges, and teacher and nursing colleges have been shut down to allow universities to offer improved training for teachers and nurses (Cosser, 2010a:4). Technikons-and-technical colleges on the one hand and technikons-and-universities on the other have merged to form universities of technology (Cosser, 2010a:4). FET Colleges, together with Sector Education and Training Authorities (SETAs), have been incorporated within the recently established Department of Higher Education and Training (DHET) (Cosser, 2010a:4). Currently, the official definition of FET is shaped by the tri-band structure of the National Qualifications Framework (NQF) and FET Colleges are expected to deliver vocationally oriented programmes on levels 2–4 (Akoojee & McGrath, 2007:210).

A specific policy process for the college sector began in 1996 with the establishment of the National Committee on Further Education (McGrath, 2010:527). In both the White Paper and subsequent Further Education and Training Act (16/2006), the emphasis was on the transformation process and its core intention was to provide a legal framework for

this process to merge former black and white colleges and to move from a racially segregated past to a multi-racial future (McGrath, 2010:527).

The rationalisation and merging of an inequitable assortment of 152 technical colleges merged in 2000 to 50 multi-site and diverse FET Colleges (Papier, 2008:6). There has also been enormous government recapitalisation plans to improve the infrastructure and curricula; sporadic lecturer competence building initiatives from both the public and private sectors; as well as the introduction of new vocational programmes in 2007 at the 50 FET Colleges (Papier, 2010:153). The economic and social challenges in South Africa demand a new type of infrastructure to enable college principals and staff at different levels to form networks to share good practice (Unwin, 2003:11). These networks will enable colleges to play an important role in terms of the creation of vocational knowledge and its implementation in practice, with programmes that are relevant (Unwin. 2003:11).

The programmes presented at FET Colleges, were extensively overhauled in 2006 and the new outcomes-based curriculum, the NCV's in 11 occupational fields were instituted at the first FET level, Level 2 in 2007, in Level 3 in 2008 and in Level 4 in 2009 (Papier, 2010:153).

Built into all the NCV programmes, are compulsory fundamental subjects such as language, mathematics or mathematical literacy and life skills and four core subjects related to each field (Papier 2010:154). These subjects are cognitively more demanding and mark a major shift from previously offered college courses (Papier, 2010:154). All of these new programmes offered at the FET Colleges have to be delivered and assessed within the outcomes-based orientation (Papier, 2010:154). In addition, colleges are constantly called upon to respond to the needs of the communities and of industry (Papier, 2010:154).

### **3.3 Contribution of FET Colleges toward skills development in South Africa**

New legislation in South Africa, like employment equity legislation and the mining charter for women, aim at developing the skills and employability of all citizens in order to alleviate poverty, addressing historical inequalities, creating employment opportunities

and improving the competitiveness of the national economy (Rasool & Botha, 2011:2). Apart from the skills shortages in South Africa, factors like affirmative action, emigration and employment equity also contribute to unemployment (Rasool & Botha, 2011:3). The inability of the education and training system to meet the growing demands of local firms have resulted in a shortage of skilled workers in virtually all economic sectors (Rasool & Botha, 2011:3). There is a tendency to perceive the problem of skills shortages from the perspective of a weak education and training system (Rasool & Botha, 2011:5).

In a graduate tracer study done by Cosser (2003:53) it was found that FET was not viewed by the respondents as a direct gateway to employment, but simply as a stepping stone to higher education and then only to find employment. The relatively high rates of unemployment of college graduates are attributed to the poor quality of schooling for the majority of young South Africans, the low level of marketability of college qualifications due to an inappropriate exit level and the relatively inferior image of technical college education that has existed historically amongst communities. Furthermore, the low remuneration levels of technical college graduates, the geographical area in which colleges are located, the mismatch between skills output and skills requirements of the industry and the racial and gender discrimination in recruitment practices, are all factors that contribute to the abovementioned viewpoint (Cosser, 2003:54).

Studies done by Chisholm (1992:3) indicated that further education and training was used both as a means to incapacitate unemployment and of providing skills to enhance employability. From 2007 onwards, FET Colleges started offering learning programmes developed and designed based on covering a number of specific career areas in which a NCV certificate could be achieved at NQF Levels 2, 3 or 4 (Papier, 2010:153).

The vocational areas in which a NCV qualification can be obtained are:

- Civil Engineering and Building Construction;
- Electrical Infrastructure Construction;
- Engineering and Related Design;
- Finance,
- Economics,

- Accounting;
- Hospitality;
- Information Technology and Computer Science;
- Management;
- Office Administration;
- Primary Agriculture; and
- Tourism (Stumpf *et al.*, 2009:8, Papier, 2009:4, SA, 2009:v).

The programmes currently offered at FET Colleges are designed to be responsive to the skills development needs of South Africa (Department of Higher Education and Training, 2009:1). However, learner attrition after Grade 9 and throughout the FET levels has resulted in an estimated 2.8 million 20 to 24 year-old people not being employed or in education or training (NEET) (Cosser, 2010b). College planners should consider the market demands when registering students.

According to Dr. Blade Nzimande, the current Minister of Higher Education and Training in South Africa, FET Colleges have emerged as a vital part of the coordinated skills development strategy for South Africa (SA, 2009:v). He further affirmed that the core goal of the college sector is to increase the number of people having access to continued education in a way that supports skills development and certification that would consequently translate into work placements (SA, 2009:v). However, there seems to be consensus that skills shortages are major obstacles to economic growth and job creation in South Africa (Rasool & Botha, 2011:2). Research conducted at the Human Science Research Council (HSRC) revealed that the majority of learners entering FET Colleges have already achieved National Senior Certificates (Grade 12 qualifications) prior to enrolment (Cosser, 2010a:5). This suggests that most of these learners revert to a lower learning level than their highest qualification, by enrolling in FET College learning programmes which negates a key principle of the NQF to facilitate programme articulation and learner progression through the education and training system (Cosser, 2010a:5). FET College provision also effectively leaves behind those students who wish to pursue single-purpose education formerly offered by technical education (Cosser,

2010c:5). FET in its present form, only partially offers the qualifications in intermediate skills in technical and vocational fields that are truly needed in the labour market (Cosser, 2010c:5).

The coexistence of an elevated unemployment and skills crisis in South Africa emphasises the value of meeting labour market demands, as well as the demands of higher education institutions, through improved schooling (Rasool, 2011:5). International evidence on the relation between economic growth and the quality of schooling add weight to the goal of President Jacob Zuma, when he called on the country's private sector to come on board in the employment creation drive (Bathembu, 2011). South Africa is facing a bifurcated employment future - at the high end is a highly educated and technically skilled workforce in tune with the needs of the international market; while at the bottom end waits an agreeable but unqualified group that is considering its prospects of employment that are being crushed by workers in countries like China (Rasool, 2011:12).

The certified unemployment rate in South Africa was in the excess of 20% for most of the period between 1994 and 2010 (Rasool, 2011:8). The South African economy needs to grow by at least 7% per year to halve the current unemployment (Rasool, 2011:7).

There is an inclination to recognise the problem of skills shortages only from the perspective of a dismal education and training system, hence the claim that the only way to deal with skills shortages is through an increase in public investment on education and training (Rasool & Botha, 2011:5). Training is necessary, but training alone is not enough to alleviate skills shortages. An increase in the public provision of training may only be appropriate if there is evidence of a decline in the ratios of persons being trained to total employment (Rasool & Botha, 2011:5). Nzimande agrees that education and training by themselves cannot resolve the problem of skills shortages (Nzimande, 2009a). He also states that according to a ministerial report, 2.8 million of the 6.8 million 18 to 24 year olds in South Africa are neither in employment, education institutions nor in workplace training (Nzimande, 2009b). Nzimande (2009b) further added that this figure of 41% of all our youth can be attributed to, amongst other things, very limited access to post-school

education and training opportunities, poor resources, the lack of financing and the restricted availability of jobs.

Although there are a number of instructional programmes offered by FET Colleges that are done through theoretical and practical instructions, the NCV programmes combine both the theory and practical aspects of vocational subjects in the yearlong course per level (SA, 2009:3, Papier, 2009:4).

Therefore, the NCV forms the backbone of all FET College programmes to ensure that the students are prepared for life and work in an increasingly technological and information-driven environment (SA, 2009:1).

### **3.4 Selection criteria currently used for admission purposes at FET Colleges**

Each FET College needs to ensure that career guidance and placement are provided and of a high and consistent standard (Department of Education, 2009:15). The ultimate goal of correct selection and placement is for students to be sufficiently prepared in terms of skills, knowledge and motivation with the purpose of developing further in their chosen fields (Department of Education, 2009:15). The focus of the selection procedure should therefore be to assist potential students to select correct subject combinations; to choose careers that match their needs, interests and aptitude; to develop a plan to meet their academic, career and life goals; and to activate such plans (Department of Education, 2009:15).

According to the FET Colleges Act (16/2006), the admission policy of a public college entails the following:

- 1) Subject to applicable policy determined by the Minister, the council of a public college determines the admission policy of the college, after consulting the the academic board and with the approval of the Members of the Executive Council.
- 2) The admission policy of a public college may not discriminate in any way and must provide appropriate measures for the redress of past inequalities.
- 3) The council may, subject to the applicable policy, the approval of the Head of Department and after consultation with the academic board-

- a) determine admission requirements in respect of particular further education and training programmes;
  - b) determine the number of students who may be admitted for a particular further education and training programme and the manner of their selection;
  - c) determine the minimum requirements for readmission to study at the public college in question; and
  - d) refuse the readmission of a student who fails to satisfy the minimum requirements for readmission.
- 4) The council of a public college must take the necessary steps within its available resources to ensure that the college is accessible to disabled students.

Apart from the stipulations in the FET Colleges Act (16/2006), in order to enter into the NCV Level 2 programme, a student requires:

- A Grade 9 certificate or;
- An NQF Level 1 qualification; or
- An approved bridging programme designed for the specific purpose to access NQF Level 2; or
- Recognition of Prior Learning Assessment (RPL) of the student to meet the basic requirements for access to NQF Level 2 programme (Anon., 2011).

Apart from the above legal requirements necessary to enrol at an FET College, the selection and placement tests administered to prospective students should identify their basic fundamental knowledge of English and Mathematics or Mathematical Literacy, and career interests (Department of Education, 2009:17). The assessment results and the information on the application forms, form the basis for choices of the placement of students in NCV programmes and subjects (Department of Education, 2009:18). In cases where interests and choices do not match, students should be referred for additional career counselling and testing in order to make the correct career choice (Department of Education, 2009:19).

The minimum duration of a NCV certificate is one full year at each of the NQF Levels of study, which are Level 2, Level 3 and Level 4. The previous level has to be successfully completed before a candidate can proceed to the next level. For a candidate to obtain a NCV certificate he/she must:

- (a) Complete the programme requirements for the particular NQF Level and obtain the distinct outcomes for that particular level; and
- (b) Comply with the internal and external assessment requirements for all subject offerings for that particular NQF Level;
- (c) Achieve 40% in the two fundamental (compulsory) subjects: the required official language and Life Orientation (includes a business computing component);
- (d) Achieve 30% in Mathematics or Mathematical Literacy; and
- (e) Achieve 50% in all four vocational subjects (SA, 2009:5).

The admission requirement of a NQF Level 5 trade and occupational directed learning programme is possession of a NCV Level 4 certificate. As the curricula for the learning programmes in the various NCV areas leading to this certificate are standardised, students in possession of a NCV Level 4 qualification should be able to continue their trade and occupationally directed studies at any FET College which offers post NQF Level 4 non-Higher Education (HE) qualifications (Stumpf *et al.*, 2009:20).

The admission requirements for the Vuselela FET College are a Grade 9 Certificate or higher qualification, but preferably a Grade 10 or Grade 11 Certificate (Vuselela FET College, 2011).

### **3.5 Selection process of prospective NCV Level 2 students at the Vuselela FET College**

Admission testing is a high stakes attempt and the potential issues that may arise are multi-faceted within multicultural and multilingual environments (Cronje, 2009:1). Many institutions have constructed a test battery consisting of both cognitive and non-cognitive tests to aid in the selection process of new applicants (Cronje, 2009:27). The selection process for the admission and placement of potential students at the Potchefstroom and

Klerksdorp campuses of the Vuselela FET College includes two psychometric instruments, the The General Scholastic Aptitude Test (GSAT) (Senior Shortened Form), and the Learning and Study Strategies Inventory High School Version (LASSI-HS); as well as the candidates' last school reports – minimum Grade 9. The results of the psychometric instruments and the school results are used for the selection and placement of the students at the Potchefstroom and Klerksdorp campuses of the Vuselela FET College (Meyer, 2008, Oosthuizen, 2007).

### **3.5.1 General Scholastic Aptitude Test (GSAT)**

The GSAT Senior Shortened Form will be discussed in more detail in Chapter 4.

The GSAT is a standardised South African aptitude test that gives a measure of academic potential. It is designed to measure both verbal and non-verbal (performance) potential and gives a global score of scholastic aptitude. By implication, the GSAT gives an indication of general intelligence (g) of secondary school learners in a modern technological society (Claassen *et al.*, 2008:1). The GSAT is a complete revision of previous group intelligence tests and measures the developed general scholastic aptitude of South African learners (Claassen *et al.*, 2008:1). The GSAT was revised in the early 1990's by the HSRC and adapted for use in South Africa and is still in use by a number of psychological assessment practitioners (Foxcroft *et al.*, 2004:24, 76). Psychologists and educators find the test an invaluable tool for facilitating optimal education for all and assessing aptitude and ability (Claassen *et al.*, 2008:1, Foxcroft *et al.*, 2004:93). Items used in the test can be grouped as word analogies, word pairs, verbal reasoning, number series, figure analogies and pattern completion (Louw *et al.*, 1998:343).

The Vuselela FET College initially adopted the policy that only students with a GSAT-stanine score of at least 3 (three) would be admitted. However, since 2007 there has been a lot of pressure from the National Department of Education to increase the admission rate of students (Bathembu, 2011, Nzimande, 2009a, Oosthuizen, 2007). This pressure has obligated the management of the Vuselela FET College to lower its admission policy by admitting students with GSAT stanine scores of 1 (one) (Oosthuizen, 2007).

### **3.5.2 Learning and Study Strategies Inventory High School version (LASSI-HS)**

The Vuselela FET College uses the LASSI-HS as a non-cognitive selection and placement instrument. The LASSI-HS has also been researched as a predictive measure for academic achievement for college students (Marrs *et al.*, 2009:125). The research focused on the relationship between study skills and academic performance. The best predictors of performance were academic self-efficacy and achievement motivation (Marrs, *et al.*, 2009:125). Study skills such as time management, utilising information and taking notes in class were important for academic success (Marrs *et al.*, 2009:125). All the study strategies identified by the LASSI-HS are worthy goals for intervention, but motivation is especially important (Marrs *et al.*, 2009:132).

The LASSI-HS consists of 76 Likert-type self-report items, composing ten scales. According to Everson (2004:86), the LASSI-HS as a self-report measure, is the most extensively used instrument to measure students' self-regulated learning and study strategies. He further states that the use of the LASSI-HS together with other cognitive measures increases the validity of admission and selection decisions (Everson, 2004:86). Everson (2004:86) further maintained that the administration of the LASSI-HS amplifies the prediction of academic success significantly.

Although a prospective student should not be rejected in terms of the scores obtained on the LASSI-HS, the results can be used to identify problem areas that could hinder a student's potential academic success. The test scores enable the institution to develop learner support interventions in particular learning and study areas such as time-management, before the problem occurs (Papier, 2009:6).

This instrument will be discussed in more detail in Chapter 4.

### **3.5.3 Information about past academic performance**

In addition to psychometric results, colleges and universities also need information about the academic abilities of prospective learners in order to select and place students more accurately. Therefore psychological test scores in combination with information about students' past academic performance is used to make accurate predictions about the

student's future academic success (Murphy & Davidshofer, 2005:428). The validity of matriculation (Grade 12) results for admission purposes have been questioned because learners from disadvantaged backgrounds are often inadequately prepared for the final examination (Cronje, 2009:24). Zwick (2002:86) found that the use of the previously obtained academic results were somewhat more effective in predicting academic success than admission test scores alone.

Studies that were done between 1980 and 1985 at the University of the Witwatersrand by Mitchell *et al.* (1997) concluded that the matriculation (Grade 12) school results alone were not uniformly good predictors of first-year university performance. Further studies done between 1985 and 1991 concluded that the matriculation (Grade 12) mark is a reasonably good predictor of a pass/fail at university (Mitchell *et al.*, 1997). However, Mitchell *et al.* (1997) state that the mark a student gets in the matriculation (Grade 12) examination is far more than a measure of intellect. It also reflects the socio-economic and family circumstances, the academic environment in which the student is taught, the encouragement they received, the value the family places on academic achievement, and their own commitment to and interest in achieving good marks (Mitchell *et al.*, 1997). Mertens (2009:386) upholds that the grade mark average is not the only predictor of academic performance, but personal factors such as motivation, economic conditions and family responsibilities also have an influence on academic performance.

Studies done by Le Roux *et al.* (2004:86) at the Stellenbosch University between 1999 and 2001, also concluded that the emphasis placed on school results alone, create an improbable expectation of university performance. The appeal by Mitchell *et al.* (1997) and Le Roux *et al.* (2004:86) is to find an admission test battery that would discriminate adequately between potentially successful and unsuccessful students.

The minimum admission requirement for FET College registration at NCV (Level 2) is a Grade 9 certificate or Grade 9 school report that indicates promotion to Grade 10.

### **3.6 Do the selection procedures contribute to the academic success of students?**

Testing can add value to the admissions process, but it can also be misused to the disadvantage of applicants and institutions (Cronje, 2009:33). The sensitivity of this matter increases the need for transparency, reliable methodology and accountability in testing. It is essential that test implementation stay in line with best-practice guidelines in multi-cultural settings. Due to the unique and diverse range of students that apply for admission into FET Colleges, there is a need to identify admission criteria that could serve as valid predictors of academic success for first year NCV Level 2 students (Papier, 2009:7).

In an opening address at the Technical and Vocational Training (TVET) and Further Education and Training (FET) conference, Professor Metcalfe stated that young people have a constitutional right to basic education and to further education progressively provided by the state, as the means become available (Hammond, 2010). The acronym NEET (Not in Employment, Education or Training) can be further enlightened through some key statistics: 42% of young people from 18-24 are NEET; 71% of NEETS don't yet have Grade 12; 100,000 – reached Grade 12 but didn't achieve a matriculation exemption – which gives them access to university (Hammond, 2010).

The present model of education and training in South Africa, according to Michael Cosser (2010b) a chief research specialist at the HSRC, places a number of obstacles in the pathways of learners wanting to progress up the learning ladder. He mentions five notable obstacles.

- 1) 81% of graduates from programmes in FET Colleges that are meant to lead to a national senior certificate (NSC) have been found to achieve a senior certificate prior to enrolment (Cosser, 2010b). In other words, this means that many learners, who enrol for a programme that leads to the achievement of an N2 or N3 certificate, are already in the possession of a higher qualification (Cosser, 2003:31). This emphasises the value attached to technical qualifications and comments on the failure of the schooling system to prepare learners adequately for the labour market (Cosser, 2003:31).

- 2) According to the South African Nursing Council, many of the entrants have a senior certificate prior to enrolment, although the minimum entry requirement into an auxiliary nursing programme is a Grade 10 qualification (Cosser, 2010b).
- 3) 72% of young unemployed learners have a qualification at NQF Level 4 when they enrol for a learnership — the overwhelming majority (92% of this group) have enrolled for a learnership programme at a level lower than or equal to NQF Level 4 (Cosser, 2010b).
- 4) Private provision of training has been found to be far more popular than public provision at the FET Colleges - suggesting that FET Colleges are not providing relevant, credible programmes in sought-after technical and vocational learning areas that will lead to uptake in the labour market (Cosser, 2010b).
- 5) Moreover, there are too few institutional options in the FET band on the NQF to cater for the demand of the students for further learning, pathways into the labour market and into higher education (Cosser, 2010b).

The former Department of Education proposed FET Colleges to be used as second-chance institutions for learners who had dropped out of the schooling system or failed the senior certificate examination (Cosser, 2010b). Nevertheless, is this a NEET solution? FET Colleges are hardly the most appropriate vehicle for a social engineering project to get the youth off the streets and into meaningful activity such as studying towards an education (Cosser, 2010b). The main mission of the FET College is to develop technical skills at intermediate level that will form the backbone of the semi-professional work force (Cosser: 2010b).

It is very difficult to measure the comparative quality of FET Colleges in South Africa. Whereas public provision remained largely organised around nationally administered examinations and certificated qualifications, private provision has been far more diverse in terms of assessment, moderation and certification.

It is clear that there are major problems in the national skills development system. Akoojee and McGrath (2008:4) affirm that cooperation between the Department of Education (DOE) and Labour has generally been poor; the NQF has not worked as intended; and FET Colleges continue to train far fewer graduates than envisaged by

successive ministerial statements, and the quality of their output remains questionable. South Africa's inability to sustain the country's skills base has necessitated the establishment of the Joint Initiative on Priority Skills Acquisition (Jipsa) (Joint Initiative on Priority Skills Acquisition, 2008:4).

In an address by the minister of Higher Education, at a KwaZulu-Natal SETA forum meeting in Durban, Dr. Blade Nzimande stated that the success and employability rates of FET College graduates were very low. He voiced concerns regarding the alignment between what is taught at colleges and the needs of the industry (Nzimande, 2011). With nearly three million people between the ages of 18 and 24 years not in employment, the country must provide young people with better and more access to post-school education (Nzimande, 2011). This concern emphasises indications that students coming out of colleges with a NCV certificate are not finding employment, partly because employers are sceptical about the value of the NCV qualification (Cosser, 2010b). The single biggest challenge facing the education and training system is to translate and increase learner preferences into graduation in areas needed for socio-economic development and high-skill areas (Hammond, 2010). To address the problem of the 20,000 FET graduates who completed their studies but could not qualify for jobs because they could not get access to the work-place experience component, Nzimande (2011) announced that the government will turn every work-place into a training space to accommodate graduates who need work place experience.

Furthermore, statistics indicate that 59% of the NCV students, who registered in 2007, did not finish their studies over a period of three years and 29.4% of them dropped out without obtaining any qualification (Hammond, 2010). Metcalfe asserts that there is no purpose in improving access without ensuring quality of provision (Hammond, 2010). The students need to have a nurtured self-esteem and be happy people who believe in themselves in order to succeed – whereas learners battered by a competitive environment may not (Hammond, 2010).

### **3.7 Factors that proved to be problematic in the admission and selection process at FET Colleges.**

Admission testing is popular because it provides an equal benchmark for applicants, is easily administered in a group setting, can be outsourced if needed, is quantifiable, and can be easily researched to prove its effectiveness (Rust & Golombok, 1999:41). Admission, assessment and funding are intricately linked to gain access to colleges (Akoojee & McGrath, 2008:16).

According to Akoojee and McGrath, (2008:16) the admission policies in place at some of the FET Colleges are considered to prevent, rather than enable students to enrol. The throughput rate of students at colleges is a source of concern to both the management and lecturers at FET Colleges. As such, it remains the main aim of the researcher to identify factors that may contribute towards the prediction of academic success in order to help with the selection of students to best accommodate each individual, as well as the country as a whole (Akoojee & McGrath, 2008:16). Akoojee and McGrath (2008:16) claim that the waiving of the requirement that links schooling certification with admission may seem to be a move in the right direction, but that it could mean that the problem of poor schooling only is shifted from one place to another. The provision of appropriate support to make up for learning deficits in cases of inadequate schooling and college preparation could partially reduce the problem (Akoojee & McGrath, 2008:16).

- Identify factors that may contribute towards the prediction of academic success of first year NCV Level 2 students at FET Colleges by means of a theoretical study.
- Determine quantitatively whether the results obtained from psychometric and scholastic assessments contributed significantly towards the prediction of academic success of first year NCV Level 2 students at an FET College,
- Quantitatively identify the admission criteria which were the best predictors of academic success of first year NCV Level 2 students at an FET College, and
- Determine quantitatively whether there is a relationship between biographical variables such as gender and age and the academic success of first year NCV Level 2 students at an FET College.

Apart from the negative social impact on a large group of idle young people, the skills needs of South Africa's developing economy clearly demand a creative solution to this undesirable social phenomenon. A number of possible policy options regarding selection and admission at FET Colleges present themselves –

- 1) As far as expectations of practical knowledge and experience are concerned, it is important that the current curricula at FET Colleges meet industry standards.
- 2) Industry support and trust in the FET system is crucial. Distrust by the private sector in public training at present poses a threat to the credibility and future of the FET system and employment of learners after graduation.
- 3) In order to reposition FET Colleges as institutions of choice within the African community, a policy intervention plan should involve the marketing of valuable and marketable skills offered at colleges.
- 4) A record of learner skills at the level of the individual could be crucial for skills planning (Hammond, 2010).

The poor base of education is one reason why there is such a huge dropout rate, and it is complicated by poverty (Hammond, 2010).

Students who enter colleges and who are academically under-prepared do not find the support they need to succeed at college (Engstrom & Tinto, 2008:47). Low-income students are more likely to begin their higher education with fewer academic resources than their peers have, and are less likely to complete their college programmes (Engstrom & Tinto, 2008:47). Deserving South African citizens who are committed to intense vocational study and who complete all the bursary forms correctly and timeously have the opportunity to receive financial aid through the Department of Education FET College Bursary Scheme administered by the National Financial Aid Scheme (NSFAS) (Department of Education, 2009:35). Although institutions do not intentionally exclude students from college entrance, the fact that without financial support, increased access will not translate into real opportunity for students (Engstrom & Tinto, 2008:50).

The prediction for college success focuses largely on the usage of an applicants' high school academic results and standardised achievement test scores (Robbins *et al.*,

2006:598). The question being asked is how best a students' future academic success can be predicted with the use of the abovementioned indicators. (Robbins *et al.*, 2006:598). To date, standardised tests have been demonstrated as valid methods for predicting college outcomes (Robbins *et al.*, 2006:598). Robbins *et al.* (2006:599) identified three college attributes: academic performance, which can include individual class performance or cumulative grade mark average; retention, whether a student returns for a second year; and persistence to qualification attainment, the amount of time needed before a qualification is awarded. Robbins *et al.* (2006:599) also distinguished between three types of predictors for academic success: the traditional, such as standardised test scores, high school results and grade mark average; demographic factors, such as socio-economic status, race and gender; and psychosocial factors.

Due to the absence of a comprehensive sound measurement tool for the psychosocial factors, researchers constructed the Student Readiness Inventory (SRI) (Robbins *et al.*, 2006:599). The 10 scales and their definitions according to Robbins *et al.* (2006:599) are as follows:

1. Academic discipline (the amount of work a student puts into schoolwork and the degree to which he/she sees himself/herself as hardworking);
2. Academic self-confidence (reflects the extent to which a student believes he/she can perform well in school);
3. Commitment to college (commitment of the student to staying in a college and getting a qualification);
4. Communication skills (reflects how attentive a student is to the feelings of others and how well conflict situations can be resolved);
5. Emotional control (reflects how a student responds to strong feelings and how well these feelings are managed);
6. General determination (reflects the extent to which a student follows through on commitments and obligations);
7. Goal striving (reflects the strength of a student's effort to achieve objectives and end goals);

8. Social activity (reflects how comfortable a student feels meeting and interacting with other people);
9. Social connection (reflects a student's feelings of connection and involvement with the college or school community); and
10. Study skills (reflects the extent to which a student believes he/she knows how to assess an academic problem, organise a solution and successfully complete an academic assignment).

These 10 scales represent three broad domains: Motivation and academic skills, social, and self-management (Robbins *et al.*, (2006:599). The best predictors of performance were academic self-efficacy and achievement motivation; in addition, study skills such as time management, utilising information and taking notes in class were important for academic success (Robbins *et al.*, 2006:599). These scales are closely related to the sub-scales of the LASSI-HS as previously discussed.

The concerns of the Western Cape Education Department (WCED) about the poor throughput rate of students in NCV programmes, initiated research where the input of college learners, lecturers, managers, support staff and other community members was gathered (Papier, 2009:5). College respondents, in particular, agreed that the NCV programmes were high-quality curricula aimed at a particular niche market, but that learners who had been recruited, especially in 2007 had not been the “right” learners for these programmes (Papier, 2009:7). Some of the learner-related factors that contributed to poor performance and attrition were socio-economic conditions of the learners, transport problems, poor living conditions, nutrition and financial difficulties, unrealistic expectations of students, inadequate academic preparedness with regard to mathematical and language skills, school learners with learning problems recruited into NCV programmes and problems with self-management skills and self-discipline (Papier, 2008:5). Some of the programme-related factors that contributed to poor performance and attrition were the cognitive demands of particular subjects, excessive workload, unrealistic progression and certification criteria (too high) and an imbalance between practical input of the programmes and the theory (Papier, 2008:5). College related factors that could play a role were lack of recreational facilities, comfortable learning spaces for after-hour studies, computer/internet access, appropriate selection and recruitment

practices, poor lecturer quality and poor preparation by lecturers and staff turnover (Papier, 2008:6).

Demographic factors proven problematic at FET Colleges were amongst others the youthfulness and immaturity of the learners in the NCV programmes with a variation of ages between 15 and 34 years (Papier, 2008:20). Lecturers found it difficult to manage and accommodate the needs of the learners within the different age groups (Papier, 2008:20). The last grade passed by learners enrolling for the NCV programmes showed a significant proportion of Grade 12 learners (33%), Grade 11 learners (10%), Grade 10 learners (25%) and Grade 9 learners (26%) (Papier, 2008:21).

The profile of high school learners who left school to attend FET Colleges are, according to principals and school teachers, 1) learners who are not coping with the academic course or the demands of the curriculum; 2) learners are not well suited to high school; 3) learners who do not plan to go to university or any other form of higher education (HE); 4) learners who show an interest in creating things and who have practical skills; 5) dedicated but slower learners, average learners and dropouts; and 6) learners that experience difficulties with the content of subjects and who are more practically inclined (Papier, 2008:23). The principals and teachers agreed that they were not familiar with the NCV curricula and the fact that schools encouraged their academically weak learners to go and learn a skill at a college has certainly been a contributory factor to the poor performances in the NCV programmes (Papier, 2008:23).

Although a number of the students who enrolled at an FET College did so because they had not previously completed a Grade 11 or 12 and wanted to improve their prospects of getting a good job as well as their standard of living (Papier, 2008:24). However, at least on third of the students, who enrolled, were bored at school or did not want to go to school any more (Papier, 2008:24). With a few exceptions, learners had the expectation of doing more practical work than theory at college and wanted to be introduced to the working world (Papier, 2008:25). The reason for this might be either historical understandings that the students had about FET Colleges being technical colleges associated with artisan training, poor notions about vocational training or poor advertising (Papier 2008:25).

These unfulfilled expectations and nominal understanding of the demands of the NCV programme, as well as low levels of motivation, which result in learners being absent from class, showing bad behaviour and ultimately dropping out, and not necessarily admission policies might have contributed significantly to learners not being successful in completing their NCV Level 2 programme (Papier, 2008:25).

The marketing campaign of FET Colleges in 2007 was aimed at post-grade 9 school leavers, thus attracting poorly performing school learners who saw college as an easy option, and who were under-prepared for the demands of the new curricula, especially the demands of reading and writing skills, mathematical and language abilities (Papier, 2009:7). The marketing campaign of the FET Colleges needs to focus on a career path for the student and should move towards the articulation of the NCV programme with Higher Education to establish a match between the level of the student and curriculum design (Papier, 2008:23).

In 2008, more stringent entrance criteria were put in place, but the colleges found it difficult to recruit sufficient applicants who could satisfy these criteria and meet their projected student numbers (Papier, 2009:7, Oosthuizen, 2007). The reasons why students dropped out of college were similar to the reasons why they had dropped out of school to attend an FET College in the first place (Papier, 2008:36). However, reasons such as financial difficulty, substance abuse, and time management were also given as contributing factors (Papier, 2008:37).

Due to the fact that colleges had to recruit the numbers that were projected and the unwillingness of Grade 11 and Grade 12 learners to repeat their Grades 10-12, Grade 9's in schools were targeted (Papier, 2008:42). Late applicants had also been admitted to programmes without any screening or placement testing, thus leading to an unawareness of the extent of the gaps in their learning (Papier, 2008:42).

### **3.8 Factors that could impede the academic progress and success of students at FET Colleges.**

There is very little, if any, research done on learning and teaching in the FET College sector, particularly in the area of learner performance (Papier, 2008:10). The most recent South African study (REAP, 2009:4) documented factors that facilitate success for disadvantaged higher education students, and focused on key financial, academic and socio-cultural challenges that particularly poor, rural students face.

Tinto (1987:2) described the major causes of student attrition or dropout at colleges to be academic difficulty, adjustment, goals, uncertainty, commitment, integration and community membership and incongruence and isolation.

Academic difficulty: Students leave because they are unable or unwilling to meet the minimum academic standards of the institution and they frequently leave because they are forced to leave (Tinto, 1987:2). Most students though, depart voluntarily due to events that mirror the social and intellectual character of the educational institution (Tinto, 1987:2).

Adjustment is a person's inability to adjust academic and social life of the college (Tinto, 1987:2). Although orientation programmes play a major role in helping students to adjust to the new academic and socio-cultural environments to improve student retention, throughput and success, many students do not attend the orientation sessions (Jones *et al.*, 2008:51). Innovative orientation strategies aim to engage the families in providing their own support networks for the student (Jones *et al.*, 2008:52). The mechanisms in place at academic institutions provide integrated support to assist academically vulnerable students and include aspects such as where various facilities and services are located; opportunities to meet some of the lecturers; and being introduced to certain academic terminology (Jones *et al.*, 2008:51). Orientation is aimed at enhancing both academic and social adjustment of first-year students (Jones *et al.*, 2008:51).

Goals reflect the extent of individual commitment to the goal of college completion (Tinto, 1987:2). Students, who are well prepared for the transition into higher education,

will settle down to their studies and new environment and are more likely not to drop out of the system in their first year of study (Jones *et al.*, 2008:43). Academically this means that students, who can cope with their newfound freedom, are responsible in the way they manage their studies and are able to prioritise their studies along with other issues in their lives (Jones *et al.*, 2008:44).

Many students enter their college careers without formulating their educational and career goals and they leave, rather than persevere (Tinto, 1987:2). Papier (2009:24) found that at least a third of the students were enrolled at college or in a college programme by default. They either were bored with their current situation or could not pursue a course due to wrong subject choices or financial difficulties (Papier, 2009:24). Students with the inner strength and determination to overcome difficulties and to succeed no matter what, do so to uplift not only themselves, but also their families and sometimes even their communities (Jones *et al.*, 2008:72). Personal characteristics such as willpower, determination, self-motivation and leadership qualities increase a student's capacity to succeed at college (Jones *et al.*, 2008:72).

Commitment: Not all students possess the commitment to complete their college qualifications, which normally requires a considerable amount of effort (Tinto, 1987:2). Students in their first year of study are largely unprepared for the demands of college education (Jones *et al.*, 2008:41). The shift from a disciplined and supervised school environment to a college environment, which is characterised by greater independence, free time and self-discipline, makes it difficult for students to be committed to their studies (Jones *et al.*, 2008:43). Tracking of students by means of the results of pre-entry assessments could identify at-risk students but ongoing mentoring and evaluation of students is a more coherent and sustainable approach to provide the support that is necessary to improve student throughput (Jones *et al.*, 2008:66).

Integration and community membership: In the academic and social life of college, the lack of integration results in a significant mismatch between the needs and interests of the individual and that of the institution (Tinto, 1987:2). The key to assist students to succeed at their studies is integration (Jones *et al.*, 2008:67). First-year students should become integrated into the college environment on many levels (Jones, *et al.*, 2008:68). Academic

and social integration of students into the education environment, significantly affects their chances of academic success (Jones *et al.*, 2008:69).

Incongruence is largely due to the discrepancy between the individual student's abilities and the vision and expectation of the institution (Tinto, 1987:2). One form of incongruence, which is of concern to all institutions, occurs when the student finds the intellectual demands of the institution insufficiently stimulating (Tinto, 1987:2). There should be formalised links between academic development and student counselling to facilitate student development, support and success through a multi-disciplinary team approach (Jones *et al.*, 2008:67).

Isolation usually occurs when there is a lack of interaction between the student and other members of the institution (Tinto, 1987:2). In a study done by Jones *et al.* (2008:70) the majority of disadvantaged students experienced acute feelings of social alienation and homesickness, which was emphasised by language issues, and the culture of the campus. One of the indicators of how well students are socially integrated is their involvement in extra-curricular activities and relationships with their peers (Jones *et al.*, 2008:70). Living in a residential environment made it easier for students to form friendships and to participate in social activities, than for students who lived off-campus (Jones *et al.*, 2008:70) The students who lived off campus, experienced severe alienation (Jones *et al.*, 2008:70).

The above factors strongly suggest that serious consideration should be given to the design of a first year academic programme which will include all sorts of educational experiences that first year students should be exposed to in order to be fully educated at an FET College (Tinto, 1987:17).

The Department of Education (2009:57) suggested a few general issues for discussion by Level 2 students registered at FET Colleges that are important in the lives of students but are not covered in the subject Life Orientation. These issues are:

- Academic competencies: how to organise the work environment, study independently, use time effectively and cite your resources correctly.

- Independence issues: how to work unsupervised; prioritise studies; and think independently.
- Financial knowledge: how to manage your money by means of a budget.
- Personal mastery: how to take ownership of your life and studies, engage in healthy relationships and minimise negative peer influence.
- Personal health: how to stay sexually healthy, be trained to maintain safety at the simulated and workplace environment and eat healthy and nutritious food.
- Behavioural issues: know how to behave in practical training environments and workplaces.
- Good citizenship: be aware of good employee conduct and interpersonal skills, contribute to the human rights culture of the college and be sensitive to gender related issues.

Stewart (2004:62), investigated high completion rates (90%) in a distant learning programme and found strong links between student success and personal characteristics, such as: good study habits; being motivated to complete the programme; readiness to learn (scheduling and time management); self-discipline; self-directedness and confidence in their academic and personal competence. Other factors that the participants deemed important were the relevance of the programme for the workplace, constant feedback from the lecturer and review and adaptation of the programme to ensure it was meeting the demands of the workplace (Steward, 2004:79).

According to Cosser (2010b), three factors may impede the academic progress of students at FET Colleges. Firstly, the lack of learning opportunities at the intermediate level may hamper academic progress (Cosser, 2010b). The introduction of the NCV as a parallel qualification to the National Senior Certificate (NSC) has consequences for the college sector and for skills development at this level (Cosser, 2010a:6). Although the need in South Africa is to develop technical skills at the intermediate level, a system that runs parallel to the NSC in the schooling sector does not seem to be an appropriate option (Cosser, 2010a:11). The need is to create a technical education and training system that articulates with the labour market and with Higher Education at Levels 4 and 5 to facilitate bridging between school and Higher Education for those students on the

technical/vocational track (Cosser, 2010a:11). FET Colleges cannot be the only institutional type to expand study options at the intermediate level, but nursing colleges, agricultural colleges and teacher colleges are also needed to allow students greater opportunity at this level (Cosser, 2010a:11). The expansion of the number and type of institutions and the introduction of a community college that provides both basic and post-basic education phases, is proposed (Cosser, 2010a:13). Community colleges are the ideal option to provide access to a range of learning opportunities for all who want to further their learning and they also provide a second chance for those who are not in employment, education or training (NEETs) (Cosser, 2010a:12).

A second factor is the attempt to reform the central purpose of the FET College by creating a remedial focus for it (Cosser, 2010b). The attrition rate at universities is between 40% and 50%, which suggests that students should be enrolling in different types of institutions for qualifications other than degrees (Cosser, 2010c:5). Students are ill prepared for university studies (Cosser, 2010c:5). Learner attrition after Grade 9 and throughout the FET levels (Grades 10 to 12) has resulted in an estimated 2.8 million NEETs between the ages of 20 and 24 (Cosser, 2010c:5). The proposition of the Department of Education is to re-educate the young and unemployed at FET Colleges, but colleges are not an appropriate vehicle to get youth off the streets and into meaningful activity (Cosser, 2010c:5).

Thirdly, the mismatch between FET College provision and labour market absorption also hinders academic progress (Cosser, 2010b). The majority of students entering the post-school education system at college level will be seeking a qualification that will improve their employment opportunities (HESA, 2011). In order to align FET qualifications with the expectations of the labour market necessitates that the scope and character of FET Colleges be expanded in ways determined by capacity, regional, local and community needs (HESA, 2011). The key objective for a post-school education system is a better alignment between FET and Higher Education (HE) sections, so that students, who choose to do so, can move horizontally between institutions and progress vertically to higher-level qualifications (HESA, 2011).

According to Papier (2009:6), learners and college respondents (lecturers, managers and learner support staff) agreed on the following factors, as contributing to poor performance and attrition at FET Colleges:

- Programme related factors:

The cognitive demands of particular subjects are inconsistent with the level to which they were assigned; progression and certification criteria are set too high; and there exists an imbalance between theory and practical input of the programmes (Papier, 2009:6). The criteria for promotion and certification and the promotion concessions set by the National Department of Education were contributing factors relating to the academic difficulties of learners at the next level (Papier, 2009:40). The curriculum structure – seven subjects including three compulsory fundamentals and four vocational core subjects (with Science as optional subject in Engineering programmes) led to a situation where most learners struggled with the volume of content in each of the seven subjects, as well as the level of complexity (Papier, 2009:40). For learners who had passed Grades 11 or 12, fundamental subjects were seen as an additional burden taking up valuable, core subject, learning time (Papier, 2009:40). English as the language of learning, teaching and assessment also put non-English speakers at a disadvantage (Papier, 2009:40).

Lectures were given in both English and Afrikaans at the Vuselela FET College if the students struggled with English as the medium of instruction. The textbooks were only available in English, but assessments were made available in both English and Afrikaans. During the registration period, the students also chose the preferred language of the final assessment received from the Department of Education.

- Learner related factors:

Learner expectations with regard to the courses and course content are not being met for instance students had expectations about more practical work and less theory and they were inadequately prepared with regard to mathematical and language skills and they lacked self-management skills and self-discipline. The school learners with learning problems, who are recruited into NCV programmes, did not receive

additional assistance. The socio-economic conditions of learners such as financial difficulties, transport problems, living conditions, inadequate nutrition; are all factors that contribute to poor performance (Papier, 2009:6). Learners are under-prepared by the school system (no Maths/Science/Computers) or return to study after a period out of school (Papier, 2009:40).

Learners who had had no grounding in the subjects referred to above, especially those who had been out of the classroom for some time, struggled to cope with particularly Mathematics and Mathematical Literacy across all programme areas (Papier, 2009:40). Learners proceeded to the next level while having to complete failed subjects in addition to higher-level subjects: this stipulation led to learners carrying Level 2 and Level 3 subjects into Level 4, and having to contend with examinations in up to 11 subjects in one year (Papier, 2009:40).

At the Potchefstroom campus of the Vuselela FET College, students hounded the administration office on a daily basis at the beginning of their first year in order to obtain a space in the hostel, while temporarily sharing overcrowded rooms off campus. These students often lived in undesirable conditions and led a lifestyle that direct to absenteeism from classes.

Unfulfilled expectations and ignorance concerning the demands of the chosen programme might have contributed to the student's frustrations with the course, resulting in absenteeism, poor performance, and bad behaviour and ultimately leaving the college (Papier, 2009:25).

- College related factors:

There exists a lack of recreational facilities and comfortable spaces for after-hour studying at colleges and sometimes there is no computer and internet access available to students (Papier, 2009:6). Poor lecturer quality; high staff turnover, inadequate preparation for the new programmes and inappropriate selection and recruitment practices contributed to poor student performance as well (Papier, 2009:6). An overloaded curriculum with limited time available for completing all teaching and assessments in the programme were causes of poor lecturer quality and high staff

turnover (Papier, 2009:40). College lecturers in the old dispensation were not required to hold specific teaching qualifications as their technical qualifications and years of technical experience were considered equivalent for equal remuneration applicable to schoolteachers (FETI, 2008). College lecturers have been recruited from industry and possessed technical qualifications and wide workplace experience and knowledge (FETI, 2008). Lecturers in academic subjects such as English, Mathematics and Science entered colleges with school teaching qualifications, but little or no industry experience (FETI, 2008). Since 1998, lecturers have also acquired assessor and moderator qualifications offered by private service providers (FETI, 2008). However, it is imperative that raising the bar for college lecturers is accompanied by raising the stakes associated with a recognised profession and that new traditions of teaching skills development and lifelong learning may become established (FETI, 2008).

Although learners regarded the lecturers as being rude, disrespectful and lacking in the necessary pedagogic skills to assist them academically, college respondents across the board had serious issues about the poor culture of learning and the breakdown of discipline at the various campuses (Papier, 2009:42). By all accounts, most lecturers have worked hard under difficult conditions and have been true pioneers of the new curriculum, but given the comments on inadequate lecturer preparation, there is room for serious introspection by colleges (Papier, 2009:44).

FET students are regarded as inadequately prepared for the demands of the NCV programmes, because the school system failed them, and they looked at the FET College for alternative academic opportunities (Papier, 2009:44). In addition to extensive early support and counselling for ill-prepared learners, it is essential that the joint efforts of all colleges be brought about to build a culture of learning, trust, accountability and hope that the students need (Papier, 2009:44).

### **3.9 Alternatives that should be considered in intervention programmes for FET students.**

Papier (2009:41) listed a number of recommendations that should be considered for intervention purposes by FET Colleges:

- Address the quality of teaching, learning and assessment, including the adequate preparation and attitude of lecturers.
- Address the language barriers experienced by non-English speaking students.
- Create a culture of learning, discipline and mutual respect.
- Student support interventions should be offered particularly in academic reading and writing, time-management and other self-management skills, as well as Mathematics/Math Literacy.
- Learner-friendly campuses should be created which are safe, warm, welcoming learning spaces, with recreational/sporting facilities, internet access and adequate refreshment facilities.
- Creative lecture timetables should be drawn up to avoid excessive long days for students.
- Affordable and safe means of transport should be provided.
- Careful recruitment, selection and placement procedures should be implemented which are fair and transparent.
- Sufficient learning materials with suitable content should be made available.
- Student counselling services and referral systems should be made available where timeous identification of student problems can take place.
- Student orientation programmes must be offered in order for students to be adequately prepared for college life and study programmes.

While restating the fact that involvement between colleges, lecturers and students is important, it remains a challenge to generate involvement in settings where it is not easily obtained (Tinto & Russo, 1994:24). To obtain the goals of enhanced student involvement, colleges should change the settings in which students are asked to learn (Tinto & Russo, 1994:24). If colleges are serious in their commitment to promote student learning, it is highly unlikely that the focus should remain on student behaviour and commitment alone (Tinto, 1997:2). Colleges should consider the character of their own obligations more carefully in order to create a variety of educational opportunities in which students would want to become involved (Tinto & Russo, 1994:24). Student learning is greatly enhanced

when students participate in joint and cooperative experiences, when they are active, rather than passive, when they work together and are responsible for the learning of both the group and classroom peers (Tinto, 1997:3).

### **3.10 A pathway model to bridge the gap between school education and post-school education**

The important features of a proposed pathways model for Higher Education and Training in South Africa are (Cosser, 2010a:13, Cosser, 2010b):

- The extension of basic education, from the end of Grade 9 to the end of Grade 11 could ensure suggest progression. This extension will ensure adequate achievement of the cognitive and non-cognitive (especially emotional) skills - with particular reference to the literacy, numeracy and social domains, which are needed for progression to post-basic education and training.
- The establishment of three post-basic education and training stages, the first two, which allow for an expansion of the number and type of institutions providing post-basic education at the intermediate level. The first stage includes education and training in schools (post-Grade 12) and in colleges (Nursing, Agricultural, Technical and Vocational) towards the achievement of certificates. Stage 2 includes education and training in the same institutions as well as in teacher training colleges towards the achievement of diplomas, and Stage 3 comprises of education and training at universities towards the achievement of degrees and post-graduate certificates (Cosser, 2010a:14). The community colleges span the basic phase and stages 1 and 2 of the post-basic phase (Cosser, 2010a:14).
- The opening up of a number of progression possibilities both along and between academic and technical/vocational pathways is proposed in Grade 11 (Cosser, 2010b). The learners who follow the academic track will proceed to Grade 12 and then to post-Grade 12 (Cosser, 2010a:14). The learners who follow the technical or vocational track can proceed to a college of technology, agriculture or nursing (Cosser, 2010a:14).
- The mounting of a post-Grade 12 academic year that bridges the ever-widening gap between school and university education is planned (Cosser, 2010b).

- Teacher training and the (re)introduction of teacher training colleges, allowing for the achievement of a two-year diploma (preferred qualification for teachers in the foundation and intermediate phases) and of a four-year degree or three-year degree plus postgraduate certificate in a university (preferred qualification for teachers at the high school level) (Cosser, 2010a:14).
- The introduction of a community college that provides opportunities for NEETs as well as learners from school and from technical and vocational colleges to access further learning that is either an end in itself or a pathway to further opportunities within the community college or at a university (Cosser, 2010b). Multiple points of entry and exit from community colleges should be possible (Cosser, 2010a:15).
- The revised model provides enhanced articulation, progression and mobility as well as alternative routes into post-basic education and training (Cosser, 2010a:16).

### **3.11 Conclusion**

In this chapter the admission and selection process of first year NCV Level 2 students at FET Colleges were discussed. Factors that could influence these students' academic progress and success were considered and some alternatives and recommendations were introduced for FET Colleges and post-school education. In the next chapter, the research design and methodology that were used in the empirical investigation will be discussed.

# CHAPTER 4. RESEARCH DESIGN AND RESEARCH METHODOLOGY

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## **4.1 Introduction**

In the previous chapters, the factors relating to the academic success of first year FET students were discussed. Attention was also given to the problem of predicting the academic success of first year NCV Level 2 students at FET Colleges.

In this chapter, the research design and methodology followed in the empirical part of the research, will be discussed.

## **4.2 Research questions**

For the purposes of the empirical part of the research, the following research questions were formulated:

- Which factors contribute towards the prediction of academic success of first year NCV Level 2 students at FET Colleges?
- To what extent do the results obtained from psychometric and scholastic assessments contribute towards the prediction of academic success of first year NCV Level 2 students at an FET College?
- Which admission criteria are the best predictors of academic success of first year NCV Level 2 students at an FET College?
- Is there a significant relationship between gender and age and the academic success of first year NCV Level 2 students at an FET College?

## **4.3 Research objectives**

In accordance with the above stated research questions, the following research objectives were formulated:

- To determine whether the results obtained from psychometric and scholastic assessments contribute significantly towards the prediction of academic success of first year NCV Level 2 students at an FET College, and
- To identify the admission criteria which were the best predictors of academic success of first year NCV Level 2 students at an FET College?
- To determine whether there is a significant relationship between biographical variables such as gender and age and the academic success of first year NCV Level 2 students at an FET College.

#### **4.4 Research design and methodology**

In order to answer the research questions and achieve the aims of the research, the empirical research departed from a positivist paradigm. The investigation departed from a positivist paradigm because a statistical data analysis would reveal which variables contributed the best towards the prediction of academic success of first year NCV Level 2 students at FET Colleges. Positivists are guided by three basic beliefs:

- The world is external and objective;
- The observer is independent;
- Science is value-free (Easterby-Smith *et al.*, 1991:31).

A quantitative non-experimental, ex post facto approach was followed. Ex post facto research draws on cold data to describe occurrences or patterns after an event has taken place (Mills et al., 2009:40). Attributes such as academic aptitude and self-esteem cannot be manipulated and must therefore be examined through ex post facto research (Ary et al., 2009:369).

Johnson (2001:3) states that a considerable portion of educational research is non-experimental because important variables cannot be manipulated. The classification of the non-experimental research is done according to the primary objective of the researcher, namely prediction, description or explanation (Johnson, 2001:8-9).

#### **4.4.1 Study population**

The launching point for any study, regardless of the design category, is a definition of the study population. It is important that the individuals eligible for inclusion in the study should be representative of the population to which the findings will be applied. Babbie and Mouton (2006:173) define a population as the theoretically specified collection of elements or entities that are researched. In this case the study population consisted of all the first year students who registered for the NCV Level 2 certificate at the Potchefstroom and Klerksdorp campuses of Vuselela FET College for the first time (n = 309).

The data set used for the purposes of data analysis consisted of the scores that 270 first year students obtained on the General Scholastic Aptitude Test (GSAT) and the Learning and Study Strategies Inventory High School Version (LASSI-HS, as well as the average percentage that they obtained on their last school reports (grade mark average).

Students who registered at the college without completing the GSAT and the LASSI-HS were excluded from the data set. Table 5.5 in Chapter 5 gives information about the different programmes that the first year students registered for in 2008.

#### **4.4.2 Data collection instruments and procedure**

The following psychometric instruments were used for the purposes of data collection:

- The GSAT (Senior Shortened Form)
- The LASSI-HS
- In order to determine the scholastic achievement of the first year students, their last school reports were consulted and based on the results that they obtained in their individual subjects, mean percentages were calculated.

##### *4.4.2.1 The General Scholastic Aptitude Test (GSAT)*

###### **4.4.2.1.1 Background**

The GSAT is an example of a conventional measuring instrument that aims to measure scholastic aptitude or academic intelligence (Claassen *et al.*, 2008:1). Measurement of cognitive abilities of South African youth is challenging because of the differences in their learning environments at home (Louw *et al.*, 1998:343). The GSAT can be used to measure Vernon's educational and verbal performances and is subsequently dependent on previous educational opportunities (Vernon, 1969:27).

Claassen *et al.*, (1993:1) described the GSAT as an impartial aid in determining the reasoning or problem solving abilities of students. The GSAT is a conventional static test that measures prior learning and is thus classified as a cognitive test of academic ability or scholastic aptitude (Murphy, 2002:125, Claassen *et al.*, 1993:2).

The GSAT measures various reasoning and problem-solving abilities associated with academic performance in a high school setting. Claassen *et al.* (1993:2) explained that the GSAT is a complete revision of group intelligence tests that specifically measures cognitive academic ability. The manual of the GSAT further explains that although the test may be used as an intelligence test under certain circumstances, its prime role is that of estimating general scholastic aptitude and does not aim to provide a differentiated picture of a broad range of intellectual functioning (Claassen *et al.*, 1993:2). The estimate of general scholastic aptitude is useful for both environmentally disadvantaged and non-environmentally disadvantaged students. The norm score gives a relatively good estimate of an individual's present level of reasoning ability and is therefore a reasonable predictor of scholastic aptitude and therefore scholastic performance (Claassen *et al.*, 1993:25).

The GSAT (Senior Series) was developed for Afrikaans and English speaking South African learners from the ages of 13 years and 6 months to 18 years. Three versions of the test are available, namely a full version, a shortened version and a shortened power version in which the time for completion of the subtests is limited. The GSAT can be administered in English or Afrikaans and two alternate forms (form A and B) of equal difficulty, with one set of norms between them, are available. For the purposes of this research, the shortened power version of the test was administered as it was able to elicit valuable information about general scholastic aptitude as well as verbal and non-verbal intelligence factors, and it did not take much time to administer – depending on the

language preference of the first year students - either. Form A of the Afrikaans or English versions of the test was administered.

#### 4.4.2.1.2 Uses of the GSAT

The GSAT can be used as an objective instrument in determining a prospective student's general level of academic ability in order to guide and direct the administrators with regard to the academic ability of the student. It can be used as a screening test for admission to colleges and universities and is an objective measure to determine the placement of students in college programmes.

The GSAT is used at the Vuselela FET College for purposes of assessing the scholastic aptitude of students from all population groups for the purposes of selection and admission. In most instances, the GSAT is used as an additional assessment tool in broadening college access to students, who would normally be rejected based on their school leaving results alone.

#### 4.4.2.1.3 Description of the subtests

The GSAT consists of six subtests but in the interests of time and efficiency, a shortened power test was composed. This shortened format of the test consists of four subtests, two of which assess verbal ability and two which assess non-verbal ability.

The verbal section consists of Subtests 1 and 3 whereas the nonverbal section consists of Subtests 2 and 4 (Claassen *et al.*, 1993:4). Short descriptions of the subtests are given below:

- Subtest 1: Word Analogies- a measure of the ability to observe the relation between two words and to use this relation to complete another word pair by analogy as an aspect of verbal reasoning ability. The assumption is made here that the word analogies test gives a good indication of verbal reasoning.

- Subtest 3: Verbal Reasoning – a measure of the ability to determine relations, to form new concepts and to manipulate them in a logical manner is an aspect of verbal reasoning ability.
- Subtest 2: Figure Series- a measure of the ability to determine relations between numbers in a series, to deduce the rule applicable to a particular number series and apply it to complete the number series. These provide a good indication of nonverbal reasoning.
- Subtest 4: Pattern Completion – a measure of the ability to observe figures or patterns accurately, to determine the relation between the figures or patterns and to be able to apply the rules to complete the patterns. This provides a measure of nonverbal reasoning ability (Claassen *et al.*, (1993:4).

When this test was revised, in the early 1990's, the revision was based on learners who received their school education in either English or Afrikaans. The norm group was thus derived from pupils from the previous House of Assembly, House of Delegates and House of Representatives' education departments, that is, White, Coloured and Indian pupils (Claassen *et al.*, 1993:5). Furthermore those learners used to norm the tests had to be comfortable in a modern scientific-technological society.

The norm score provides a hint of a student's existing level of reasoning ability with respect to scholastic material and comparable age. Thus provided that it is not used as an intelligent test, the GSAT has a legitimate application as a measure for forecasting scholastic success in the entire population.

#### 4.4.2.1.4 Constructs of the GSAT

The following constructs are measured by the GSAT: verbal and nonverbal reasoning abilities. Based on the testee's performance in the verbal and nonverbal subtests, verbal and nonverbal scores are calculated.

#### **Verbal score**

This score combines the scores on subtests 1 and 3 to provide a measure for verbal reasoning.

### **Nonverbal score**

This score combines the scores on subtests 2 and 4 to provide a measure for nonverbal reasoning.

### **Total score**

The score combines the verbal and nonverbal scores.

#### 4.4.2.1.5 Validity and reliability of the GSAT

The GSAT has proved to be both a reliable and valid measure of academic ability within a South African context. When the GSAT was standardised reliability, coefficients for the Verbal, Nonverbal and Total constructs were calculated using the Kuder-Richardson formula 8 (K-R 8). The GSAT has been standardised for use within the South African context. A test-retest reliability coefficient for all groups, i.e. the previously disadvantaged and the non-disadvantaged learners ranged from 0.90 to 0.95 (Claassen *et al.*, 1993:111). For the non-disadvantaged group the test-retest reliability coefficient ranged from 0.88 to 0.94. A test-retest reliability ranging from 0.84 to 0.93 was obtained from a group of previously disadvantaged learners. Correlations for all the combined scales combined were high and for the proportional test batteries they yielded validity coefficients ranging from 0.68 to 0.83 (Claassen *et al.*, 1993:107).

The reliability coefficients of constructs for a sample size of 138 in 1991 are given in Table 4.1 below (Claassen *et al.*, 1993:111):

**Table 4.1: Reliability coefficients of GSAT constructs on the 1991 sample**

<b>Construct</b>	<b>K-R 8 (1991)</b>
<b>Verbal</b>	0.91
Word analogies	
Verbal reasoning	
<b>Nonverbal</b>	0.91
Figure series	
Pattern completion	
<b>Total</b>	0.95

When the GSAT was standardised, construct validity was determined by exploratory factor analyses (Claassen *et al.*, 1993:45-53).

The GSAT has proved to be both a reliable and valid measure of academic ability within the South African context (Claassen *et al.*, 1993:45).

#### 4.4.2.2 *Learning and Study Strategy Inventory - High School Version*

##### 4.4.2.2.1 Background

The LASSI-HS was created in response to educators' request for a high school version of the LASSI (Weinstein & Palmer, 1990:20). The developmental work began in 1978 as part of the cognitive learning strategies project of the University of Texas in Austin to diagnose and address student deficiencies relating to learning and study strategies (Weinstein & Palmer, 1990:20). The initial stages of the project focused on defining the categorical scheme and items that did not deal primarily with study skills and focused on aspects of behaviour that could not be changed, which were eliminated. Likewise, items that were poorly worded were rewritten (Weinstein & Palmer, 1990:21).

The LASSI-HS is a self-report instrument and can be administered on either an individual or a group basis. The questionnaire is meant to be used as:

- a diagnostic measure to identify areas that could benefit from interventions;
- a counselling tool for academic remediation and enrichment programmes;
- planning individual prescriptions for enrichment and intervention;
- a pre-post achievement measure that focuses on learning strategies and study skills; and
- an evaluation tool to assess the degree of success of intervention programmes (Weinstein & Palmer, 1990:5).

##### 4.4.2.2.2 Content and format of the questionnaire

The LASSI-HS is a 76-item self-report instrument and can either be self-scored, or computer-scored (Weinstein & Palmer, 1990:5). The format used at the Vuselela FET College, is the self-scored format and the tests were usually scored at a central point by college counsellors. Although there is no certification or training needed to administer the tests, some expertise is needed to interpret and use the scale scores (Weinstein & Palmer, 1990:6). Only an English version of the LASSI-HS was available for students at the Vuselela FET College.

In the instructions for answering the LASSI-HS, the students are asked to read each of the 76 items in the questionnaire and to darken the bubble containing the letter that corresponds to how well the statement describes them on a scale of (a) NOT AT ALL LIKE ME, (b) NOT VERY MUCH LIKE ME, (c) SOMEWHAT LIKE ME (d) FAIRLY MUCH LIKE ME to (e) VERY MUCH LIKE ME. In addition to this, they are also instructed to answer each item according to how well the statement describes them and not in terms of how they think they should be or what others do (Weinstein & Palmer, 1990:10).

The LASSI-HS consists of the following scales (Weinstein & Palmer, 1990:6-7):

- Attitude – contains items addressing attitude and interest in school and education.  
A few examples of items included in this scale are:
  - I do not care if I finish college as long as I get a job.
  - I feel confused and undecided as to what my education goals should be.
- Motivation – addresses the student’s diligence, self-discipline and willingness to work hard.  
Examples of items included in this scale are:
  - I am up to date in my class assignments.
  - Even when study materials are dull and uninteresting, I manage to keep working until I finish.
- Time management – This scale examines the student’s use of time management principles for academic work.  
Examples of items included in this scale are:
  - I find it hard to stick to a study schedule.
  - I talk myself into believing some excuse for not doing a study assignment.

- Anxiety – These test items address the degree to which the student is concerned about school and his/her own performance.

Examples of items included in this scale are:

- I worry that will flunk out of college.
- I get discouraged because of low grades / marks.

- Concentration – The test items focus on the student's ability to pay close attention to academic tasks.

Examples of items included in this scale are:

- I find that during lectures I think of other things and don't really listen to what is being said.
- I don't understand some course material because I don't listen carefully.

- Information processing – This scale contains items addressing several sub-areas, i.e. the use of mental imagery, verbal elaboration, comprehension monitoring and reasoning.

Examples of items included in this scale are:

- I learn new words or ideas by visualising a situation in which they may occur.
- I try to relate what I am studying to my own experiences.

- Selecting main ideas – The items on this scale address the student's ability to pick out important information for further study.

Examples of items included in this scale are:

- I am able to distinguish between more important information and less important information during a lecture.
- I try to identify the main points when I listen to lectures.

- Study aids – This scale examines the degree to which students create or use support techniques or materials to help them learn and remember new information.

Examples of items included in this scale are:

- I use special study aids, such as italics and headings that are in my textbook.
- My underlining is helpful when I review text material.

- Self testing – These items focus on reviewing and preparing for tests and classes. Most of the items deal with some aspect of comprehension monitoring.

Examples of items included in this scale are:

- After a class I review my notes to help me understand the information.
  - When preparing for exams, I create questions that I think might be included.
- Test strategies – This last scale focus on a student’s approach to preparing for and taking tests and quizzes.

Examples of items included in this scale are:

- I do poorly in tests because I find it hard to plan my work in a short period of time.
- I am unable to summarise what I have just heard in a lecture or read in a textbook.

#### 4.4.2.2.3 Validity and reliability of the instrument

According to Maree and Petersen (2007:147), the validity of an instrument is the extent to which the instrument measures what it is supposed to measure. However, McMillan (2008:50) claims that the latest definition of validity was the extent to which inferences, claims, interpretations, uses and conclusions are reasonable and appropriate. Thus, McMillan’s criterion of validity is not a characteristic of an instrument, but rather depends on the nature of the evidence and its specific use (McMillan, 2008:50).

In order to determine the construct validity of the LASSI-HS which was administered to the study population of first year students, confirmatory factor analyses were done.

Sowell (2001:5) explains that the reliability refers to the consistency of the measurement of a concept and that the stability, internal reliability and inter-observer consistency are the prominent factors of reliability.

Reliability deals with whether or not the information used to base decisions on are consistent (Landy & Conte, 2009:82). High reliability is obtained when the measure or

instrument used, gives the same results when the research is repeated on the same sample (Maree & Pietersen, 2007:147). Nieuwenhuis (2007:80) asserted that when researchers speak of research validity and reliability, they are usually referring to research that is credible and trustworthy.

Various theories of reliability have been formulated over the years. Therefore, the involvement of peer researchers to assist with the interpretation of the data could enhance trustworthiness (Nieuwenhuis, 2007:80). Spearman proposed the true-score model in 1904, which has become known as the classical test theory (Traub, 1997:8).

$$X = T + E$$

where  $X$  is the imperfect, observed score,  $T$  is the true score, and  $E$  is the random error. In the classical test theory, it is assumed that the traits measured are constant and the measurement errors random (Traub, 1997:8).

A special case of the Spearman model results in the widely used coefficient of reliability and commonly referred to as the Cronbach alpha coefficient (Traub, 1997:8). McMillan (2008:49-50) explained that reliability reported as a correlation coefficient, considers the measurement error. The Cronbach alpha coefficient is used to measure the internal reliability of an instrument and is based on the inter-item correlations (Pietersen & Maree, 2007a:216). Ellis (2009) affirmed that a Cronbach alpha-value of more than 0.50 could be regarded as acceptable.

In order to determine the internal-consistency reliability of the LASSI-HS for the study population of first year FET students in this study, Cronbach-alpha coefficients were calculated for each of the ten scales. Internal consistency is a measure of the degree of similarity among the number of items formulated to measure a certain construct (Pietersen & Maree, 2007a:216). Pietersen and Maree (2007a:216) further state that researchers regard reliability estimates of 0.80 as acceptable in most applications, while values lower than 0.60 are regarded as unacceptable.

#### 4.4.2.2.4 Data collection procedure

- The GSAT

The researcher, counsellors and lecturers, administered the GSAT. The campus manager, a registered industrial psychologist, trained the test administrators.

The administrations took place in a classroom during the registration period at the beginning of the year. The test room was chosen in such a way that disturbances were minimised. The testees were arranged in rows to minimise copying.

The test booklets were checked for errors and blank or omitted pages.

Testing times for the GSAT shortened power test is: Subtest 1 – Word analogies: 6 minutes, Subtest 2 – Figure series: 11 minutes, Subtest 3 – Verbal reasoning: 16 minutes and Subtest 4 – Pattern completion: 11 minutes.

Once the testees had been seated, rapport was established with the learners and all attempts possible were made to reduce test anxiety. The testees were each handed a pencil and an eraser. They each received one answer sheet. The testees were guided when completing their information on the answer sheets. The tester demonstrated and checked systematically how the answers sheet should be completed on the answer sheet. After the completion of the personal information, the testees each received a test booklet and they were advised not to page through the booklet. All the testees were advised to open the booklet at subtest 1 and explanations of the practice examples were done on the blackboard.

The tester made sure that the testees knew what to do and how to answer the practice examples, e.g. only one answer per questions should be selected; if they do not know the answer to continue to the next question. Sufficient help and explanations were given during the practice examples. The testees were asked to turn the page and the stopwatch was started. No help or explanations were given after the completion of the practice examples. After the time of the subtest had lapsed, the testees were asked to stop, put down their pencils and to turn to the next subtest and practice examples. Testees, who finished before the time had lapsed, were advised not to page to the next or the previous subtest.

The tester walked up and down in the test room to make sure that the testees knew how to answer the questions on the answer sheet and to invigilate smooth proceedings.

The abovementioned procedure was followed for each of the subtests. After the completion of subtest 4, the tester collected the answer sheets and booklets.

Before scoring an answer sheet, the age of the testee was calculated, and the answer sheet was checked for items where two or more answers had been given. The answer sheets were placed under the scoring stencils and scored. Space is provided on the answer sheet for writing down the raw scores of the verbal, non-verbal and total raw marks, as well as the norm scores.

The scoring of the answer sheets were done by the counsellors and filed alphabetically and according to the date on which the test was written. The scored sheets were used for placement purposes when a student came to register.

- The LASSI-HS

The researcher, counsellors and lecturers who had been trained as test administrators by the campus manager, a registered industrial psychologist, administered the LASSI-HS.

The administration took place in a classroom during the registration period at the beginning of the year. Rapport was established with the learners and all attempts were made to reduce test anxiety. The participants were informed that the results of the tests would enable the Student Support Division of the college to provide relevant support to students concerning study skills and learning strategies.

Each student received a pencil with an eraser and a LASSI-HS questionnaire with instructions. The students' attention was focused on the space for personal information that had to be completed on the first page of the questionnaire. The administrators explained that after reading each statement, the student had to colour in the circle with pencil, which contained the letter that best describes him/her. The students had to respond to the different items by using the following 5-point scale:

- (a) NOT AT ALL LIKE ME – the statement would only be true of the student on rare occasions.
- (b) NOT VERY MUCH LIKE ME – the statement would not generally be true of the student.
- (c) SOMEWHAT LIKE ME – the statement would be true about half of the time.
- (d) FAIRLY MUCH LIKE ME – the statement would generally be true of the student.
- (e) VERY MUCH LIKE ME – the statement would be true of the student most of the time.

The students completed the questionnaire individually. The administrators continued to give individual assistance to the students where necessary, for example to explain the meaning of some words or phrases to them.

There was no time limit to the questionnaire and after completion of the test, the students could leave the room. The researcher did the scoring of all the questionnaires with the help of a trainee counsellor.

#### **4.4.3 Data analysis**

The researcher did the data capturing and a statistician from Statistical Consultation Services of the North West University (Potchefstroom Campus) performed the statistical analysis.

The following statistical procedures were done:

- Descriptive statistics: calculations of summary statistics, e.g. means and standard deviations.
- Confirmatory factor analyses to determine the construct validity of the LASSI-HS.
- The calculation of Cronbach-alpha coefficients to determine the reliability of the LASSI-HS.
- Spearman rank order correlations to determine the relationship between predictor variables and their influence on the students' academic success (whether they have received a certificate after their first year of study, or not).

- Binary logistic regression to determine the best predictor variables of academic success.

#### **4.4.4 Ethical aspects**

The researcher approached the Chief Executive Officer, of the Vuselela FET College, for permission to conduct the research (See Appendix A). Permission was granted on the basis that the placement tests and academic results of first year students who registered for the NCV courses could be used; and the findings of the research should be made available to the Vuselela FET College upon request (See Appendix B).

#### **4.5 Conclusion**

In this chapter, the research design and method of research were discussed.

In Chapter 5, the results and conclusions emanating from the empirical investigation will be presented.

# CHAPTER 5. RESULTS AND CONCLUSIONS

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## 5.1 Introduction

In the previous chapter, the research design and method which were followed in the empirical investigation was discussed.

In this chapter, the results of the statistical analyses will be presented and discussed and on the basis thereof, conclusions will be drawn.

## 5.2 Biographical information about the study population

As previously mentioned in par 4.4.1 in Chapter 4, the General Scholastic Aptitude Test (GSAT) and Learning and Study Strategies Inventory High School Version (LASSI-HS) were administered to first year FET College students (n=270) who registered for the first time at the Potchefstroom and Klerksdorp campuses of the Vuselela FET College.

In Tables 5.1 to 5.4 information is provided about the first year students' last school results, age, gender, enrolment and success rates per programme.

### 5.2.1 Last school results

The minimum academic requirement to register for an NCV Programme, is a Grade 9 certificate and all first year students had to submit their Grade 9 school reports, or last school results, if they had passed a higher grade than Grade 9. Information regarding the grade mark average of the participants is given in Table 5.1 below. The mean percentage was calculated by using the marks obtained in the last school report of the grade passed.

**Table 5.1 Last school results – grade mark average**

Mean percentage: (%)	Minimum (%)	Maximum (%)	Std.dev. (%)
43.77%	25%	78%	8.65%

The mean percentage of 43.77% indicates that in general the first year students' last school results can be described as below average.

### 5.2.2 Age of the first year students

Information regarding the mean age of the first year students is given in Table 5.2 below:

**Table 5.2 Mean age of the first year students**

N	Mean age	Minimum age	Maximum age	Std. Dev.
270	19 years, 11 months (19.92)	16 years	42 years	2 years, 10 months (2.80)

The chronological age of first year students at the time of testing was calculated by using the birth dates provided on the GSAT answer forms. The youngest student was 16 years old, and the eldest was 42 years old. The mean age is a reflection of the type of students who were targeted during the marketing campaign: students who had just finished their Grade 9 or higher qualifications at school and students who wished to improve their qualifications or NEETs (students who were Not in Employment, Education or Training), but were in possession of a Grade 9 or higher school qualification.

### 5.2.3 Gender of the first year students

Information regarding the gender of the first year students is given in Table 5.3 below:

**Table 5.3 Gender of first year students**

Gender	Number	%
Male	136	50.6%
Female	133	49.4%
Total	269	100%

Information about the first year students' gender was obtained from the GSAT answer forms. The information above reflects an equal gender representation.

#### 5.2.4 Enrolment figures per programme of study

The following table displays the first year students' enrolment figures per programme of study:

**Table 5.4 First year students' enrolment figures per programme of study**

<b>Programme enrolled for</b>	<b>n</b>	<b>%</b>
Electrical Engineering	25	9.26
Hospitality	11	4.07
Tourism	13	4.81
Information Technology	21	7.78
Civil Engineering	17	6.30
Office administration	76	28.15
Finance and Economics	42	15.56
Engineering and design	10	3.70
Management	29	10.74
Marketing	26	9.63
<b>Total number of first year students</b>	<b>270</b>	<b>100.00</b>

From the above it can be seen that the highest percentage (28.15%) of the first year students enrolled in the Office Administration programme, whereas the lowest percentage (3.70%) enrolled in the Engineering and Design programme. When the different programmes are grouped together, 19.26% of the students enrolled in the engineering programmes (Electrical, Civil, Engineering and Design), 8.88% in Hospitality and Tourism programmes and 54.34% in commercially orientated programmes (Office Administration, Finance and Economics, Management and Marketing).

#### 5.2.5 First year students' success rates per programme

In order to determine first year students' success rates per programme of study, information about the number of students who met the criteria of receiving an NCV Level 2 certificate at the end of the year, was obtained from the FET College.

Information about first year students' success rates (expressed as certificated and non-certificated) per programme of study, is given in Table 5.5 below.

**Table 5.5 First year students' success rates per programme of study**

<b>Programme enrolled for</b>	<b>Certificated</b>	<b>Non-certificated</b>	<b>Total</b>	<b>Success rate %</b>
Electrical Engineering	3	22	25	12.00
Hospitality	1	10	11	9.1
Tourism	5	8	13	38.5
Information Technology	0	21	21	0.00
Civil Engineering	4	13	17	23.5
Office administration	23	53	76	30.3
Finance and Economics	13	29	42	30.95
Engineering and design	2	8	10	20.00
Management	6	23	29	20.7
Marketing	8	18	26	30.8
<b>TOTAL</b>	<b>65</b>	<b>205</b>	<b>270</b>	<b>24.1</b>

The success rate for all the first year students is 24.1%. This means that 75.9% of the first year students did not meet the requirements of receiving a certificate for the programme that they have enrolled for. This is an alarming state of affairs and the FET College should conduct an extensive investigation into the causes of this dismal success rate. Not a single student managed to receive a certificate in Information Technology and the highest success rate of 38.5% was obtained in Tourism.

### **5.2.6 Biographical profile of the study population**

Based on the information contained in Tables 5.1 – 5.5 above, the following biographical profile of the study population emerged:

- The first year students' scholastic results as obtained from their last school reports were below average (mean percentage = 43.77%);
- The first year students were relatively young in terms of their mean age (19 years, 11 months);
- Male and female students were almost equally represented in the study population (males 50.6% and females 49.4%);

- The largest percentage of the first year students (28.15%) enrolled in the programme Office Administration, whereas the smallest percentage (3.70) enrolled in Engineering and Design; and
- Only 24.1% of the first year students were academically successful and received a certificate at the end of their first year of study.

### **5.3 Validity and reliability of the LASSI-HS**

Because the LASSI-HS has not been standardised for a South African study population, the validity and reliability of the instrument were determined. The process is described in paragraphs 5.3.1 and 5.3.2 below.

#### **5.3.1 The validity of the LASSI-HS**

In order to determine the construct validity of the LASSI-HS which was administered to the study population of first year FET College students at the Potchefstroom and Klerksdorp campuses of the Vuselela FET College, confirmatory factor analyses were performed. According to Pietersen and Maree (2007a:219) a factor analysis is usually done to establish which items belong together and thus measure the same construct.

The factors were extracted by using principal component factor analysis with Oblimin rotation method and factors with Eigen values larger than one, were extracted (Schwartz, 2001:38). Eigen values indicate the degree of variance explained by the principal component of each factor. Correlations  $< 0.3$  are not important in practice, and all factor loadings of items with factors larger than 0.3, were reported in Tables 5.6 – 5.16. The details of the factor analyses for the different scales will now be discussed.

##### *5.3.1.1 Factor Analysis 1: Attitude*

The first scale, *Attitude*, contains items addressing attitude and interest in education and school and the initial Eigen values revealed two factors. The Kaiser-Meyer-Olkin measure (KOM) - of sampling adequacy indicates the degree to which the variables are related and it varies between 0 and 1, where values closer to 1 are better (SPSS Inc.,

2011, Schwartz, 2001:25). As a rule of thumb the KMO should be 0.6 or higher in order to proceed with factor analysis, where 0.5 is the cut-off value and 0.8 or higher a desirable value (Schwartz, 2001:26). The KMO value for *Attitude* was 0.8 which is higher than the suggested minimum. Bartlett’s test of sphericity tests the null hypothesis and a value where Sig.  $\leq$  0.001 indicates that the null hypothesis may be rejected and that the variables are not completely uncorrelated. Exploratory Factor Analysis (EFA) is generally used to discover the factor structure of a measure. The extraction method used in the present study, is the principal axis factoring with iterated communalities, also known as Oblimin rotation. When the factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Two factors that explained 45.58% of the variance in the scale: *Attitude*, were identified and construct validity can thus be accepted. The communalities of the items varied between 0.07 and 0.50, indicating that the information of some items was not sufficiently explained by the extracted factors. Communalities refer to the percentage of the variance of each item which is accounted for by the two extracted factors.

The two factors which emerged from the confirmatory principal component factor analysis for the subscale *Attitude* and the items that loaded on each factor are given in Table 5.6 below.

**Table 5.6: Attitude – Pattern Matrix**

No.	Items	Factor	
		1	2
5	I don’t care if I finish College, as long as I can get a job.	0.661	
38	I do not care about getting a general education, I just want to get a good job.	0.568	
14	I feel confused and undecided as to what my education goals should be.	0.422	
69	In my opinion, what is taught in my courses is not worth learning	0.296	-0.212
29	I often feel like I have little control over what happens to me at College.	0.157	
18	I would rather not be at College.		-0.761
45	I only study the subject I like.		-0.593
51	I dislike most of the work in my classes.		-0.387

The different items that loaded on each factor were considered and a descriptive label was then given to each of the two factors. Four items loaded on Factor 1 and four items loaded on Factor 2. Item 29 had a small loading on Factor 1.

The interpretation of these factors and their items, is briefly explained below:

Factor 1: (Clarity about educational goals).

Items 5, 38, 14, 29 and 69.

Factor 2: (Feelings about college education).

Items 18, 45 and 51.

The first factor addressed students' clarity about their own educational goals, whereas the second factor explained their feelings about the importance of college education. Item 29, could contribute to both factors, as this item may reveal students' clarity about their educational goals as well as their feelings about college education. However, it should be borne in mind that the students completed the LASSI-HS during the pre-registration period, and it would be very difficult for them to express their opinions about the control that they had about what happened at college, since they had no experience of college life and education at all.

According to Weinstein and Palmer (1990:5), *Attitude* relates to the will component of strategic learning and assesses students' attitudes and interests in college and achieving academic success. This can be assessed by the students' clarity about their own educational goals and whether school is really important or worthwhile to them (Weinstein & Palmer, 1990:5).

Although the division of this factor into two sub factors makes theoretical sense, only the single factor *Attitude* as mentioned in the manual of the LASSI-HS (Weinstein & Palmer, 1990:5) will be used for the purposes of further statistical analyses in this study.

### 5.3.1.2 Factor Analysis 2: Motivation

The next scale, *Motivation*, addresses students' diligence, self-discipline and willingness to work hard and revealed two factors. The KMO value for *Motivation* is 0.8 which is

higher than the suggested minimum (see Par. 5.3.1.1). Bartlett’s test of sphericity tests the null hypothesis and a value where Sig.  $\leq 0.001$  indicates that the null hypothesis may be rejected and that the variables are not completely uncorrelated (see Par. 5.3.1.1). Two factors that explained 51.63% of the variance in the scale: *Motivation*, were identified and construct validity can thus be accepted. The communalities of the items varied between 0.15 and 0.58, indicating that some of the information of the items not sufficiently explained by the extracted factors. Communalities refer to the percentage of each item’s variance which is accounted for by the two extracted factors.

The two factors which emerged from the confirmatory principal component factor analysis for the scale *Motivation* and the items that loaded on each factor are given in Table 5.7 below.

**Table 5.7: Motivation – Pattern Matrix**

No.	Items	Factor	
		1	2
28	I work hard to get a good grade/mark, even when I don’t like a course.	0.796	-0.203
13	Even when study materials are dull and uninteresting, I manage to keep working until I finish.	0.744	
10	I am up-to-date in my class assignments.	0.709	
41	I set high standards for myself at College.	0.389	0.218
56	I read textbooks assigned for my classes.	0.342	
16	I come to class unprepared.	0.269	0.202
33	I talk myself into believing some excuse for not doing a study assignment.		0.644
49	When work is difficult I either give up or study only the easy parts.		0.593

The different items that loaded on each factor were considered and a descriptive label was then given to each of the factors. Where items loaded on both factors, the highest factor loading was considered. Six items loaded on Factor 1 and two items loaded on factor 2. Factor 1 relates to Diligence and Factor 2 relates to Lack of Self-discipline.

The interpretation of these factors and their items, is briefly explained below:

Factor 1: (Diligence).

Items 28, 13, 10, 41, 56 and 16.

Factor 2: (Lack of Self discipline)

Items 33 and 49.

The first factor addressed students' diligence and interest in class activities, whereas the second factor explained their lack of self-discipline, their making up excuses and not keeping up with assignments.

According to Weinstein and Palmer (1990:5), *Motivation* relates to the will components of strategic learning and assesses students' diligence, self-discipline and willingness to exert the necessary effort to complete academic requirements successfully. This can be assessed by a student's diligence to stay up to date with class assignments and whether they easily give up in difficult classes (Weinstein & Palmer, 1990:5).

Although the division of this factor into two sub-factors makes theoretical sense, only the single factor, *Motivation* as mentioned in the manual of the LASSI-HS (Weinstein & Palmer, 1990:5), will be used for further statistical analyses in this study.

### 5.3.1.3 Factor Analysis 3: Time Management

The *Time Management* scale examined how well the students made use of time management principles for academic work and revealed two factors. The KMO value for *Time Management* is 0.7, which is higher than the suggested minimum (see Par. 5.3.1.1). Bartlett's test of sphericity tests the null hypothesis and a value where  $\text{Sig.} \leq 0.001$  indicates that the null hypothesis may be rejected and that the variables are not completely uncorrelated (see Par. 5.3.1.1). Two factors that explained 44.70% of the variance in the scale *Time Management* were identified and construct validity can be accepted. The communalities of the items varied between 0.16 and 0.51, indicating that some information of the items was not sufficiently explained by the extracted factors. Communalities refer to the percentage of each items' variance which is accounted for by two extracted factors.

The two factors which emerged from the confirmatory principal factor analysis for the scale *Time Management* and the items that loaded on each factor are given in Table 5.8 below.

**Table 5.8: Time Management – Pattern Matrix**

No.	Items	Factor	
		1	2
3	I find it hard to stick to a study schedule.	0.506	
66	I put off studying more than I should.	0.473	
74	I tend to spend so much time with friends that my coursework suffers.	0.461	
42	I end up “cramming” for almost every test.	0.439	
36	When it comes to studying, procrastination is a problem for me.	0.381	
58	When I decide to study, I set aside a specific length of time and stick to it.		-0.749
22	I only study when there is the pressure of a test.	0.292	-0.450
48	I make good use of daytime study hours between classes.		-0.445

The different items that loaded on each factor were considered and a descriptive label was given to each of the two factors. Five items loaded on Factor 1 and three items loaded on Factor 2. Where one items accounted for loadings on both factors, the item with the highest loading, was considered. Factor 1 relates to Procrastination and Factor 2 relates to Time Management.

The interpretation of these factors and their items, is briefly explained below:

Factor 1: (Procrastination).

Items 3, 66, 74, 42, and 36.

Factor 2: (Time management).

Items 58, 22 and 48.

The first factor relates to procrastination and how well the student makes use of and organises the available study time, and the second factor is about effective time management.

According to Weinstein and Palmer (1990:6), *Time Management* relates to the self-regulation component of strategic learning and assesses students' time management principles for academic tasks. This can be assessed by how well a student is organised and whether the students anticipate any scheduling problems (Weinstein & Palmer, 1990:6).

Although the division of this factor into two sub-factors makes theoretical sense, only the single factor *Time Management* as mentioned in the manual of the LASSI-HS (Weinstein & Palmer, 1990:6) will be used for further statistical analyses in this study.

#### 5.3.1.4 Factor Analysis 4: Anxiety

The *Anxiety* scale addresses the degree to which students worry about school and their performance, and three factors were revealed. The KMO value for Anxiety is 0.7 which is higher than the suggested minimum (see Par. 5.3.1.1). The Bartlett test of sphericity tests the null hypothesis and a value where Sig.  $\leq$  0.001 indicates that the null hypothesis may be rejected and that the variables are not completely uncorrelated (see Par. 5.3.1.1). The three factors explained 58.35% of the total variance in the scale: *Anxiety*, was identified and construct validity can be accepted. The communalities of the items varied between 0.03 en 0.78, indicating that some information of the items was not sufficiently explained by the extracted factors. Communalities refer to the percentage of the variance of each item which is accounted for by the three extracted factors.

The three factors which emerged from the confirmatory principal component factor analysis for the scale *Anxiety* and the items that loaded on each factor, are given in Table 5.9 below.

**Table 5.9: Anxiety – Pattern Matrix**

No.	Items	Factor		
		1	2	3
54	Worrying about doing poorly interferes with my concentration on tests.	0.810		
63	I get so nervous and confused when taking an examination that I fail to answer questions to the best of my ability.	0.528		

57	I feel very panicky when I take an important test.		-0.793	0.233
9	I get discouraged because of low grades/marks.		-0.532	
1	I worry that I will flunk out of College.	0.305		0.380
25	I am very tense when I study.	0.332		0.364
31	Even when I am well prepared for a test, I feel anxious.		-0.208	0.328
35	When I begin an examination, I feel pretty confident that I will do well.			0.165

The different items that loaded on each factor were considered and a descriptive label was then given to each of the three factors. Two items loaded on Factor 1, Two items loaded on Factor 2 and 4 items loaded on Factor 3. Factor 1 relates to Anxiety and Ability, Factor 2 relates to Anxiety about Test Taking and Factor 3 relates to Anxiety about Academic Failure.

The interpretation of these factors and their items, is briefly explained below:

Factor 1: (Anxiety and Ability).

Items 54 and 63.

Factor 2: (Anxiety about Test Taking).

Items 57 and 9.

Factor 3: (Anxiety about Studying and Test Results).

Items 1, 25,31 and 35.

According to Weinstein & Palmer (1990:5), *Anxiety* relates to the will component of strategic learning and assesses the degree to which students worry about their academic performance and school. This can be assessed by the degree of anxiety of the student and the effect it has on concentration and whether the students are easily discouraged by low grades (Weinstein & Palmer, 1990:5).

Although the division of this factor into three sub factors make theoretical sense, only the single factor, *Anxiety*, as mentioned in the manual of the LASSI-HS (Weinstein & Palmer, 1990:5) will be used for the purposes of further statistical analyses in this study.

### 5.3.1.5 Factor Analysis 5: Concentration

The *Concentration* scale focuses on the ability of the students to pay close attention to academic tasks, and two closely related factors were revealed. The KMO value for Concentration is 0.8 which is higher than the suggested minimum (see Par. 5.3.1.1). The Bartlett test of sphericity tests the null hypothesis and a value where Sig.  $\leq$  0.001 indicates that the null hypothesis may be rejected and that the variables are not completely uncorrelated (see Par. 5.3.1.1). Two factors that explained 46.74% of the variance in the scale: *Concentration*, were identified and construct validity can thus be accepted. The communalities of the items varied between 0.15 and 0.53, indicating that the information of some items was not sufficiently explained by the extracted factors. Communalities refer to the percentage of variance of each item which is accounted for by the two extracted factors.

The two factors which emerged from the confirmatory principal component factor analysis for the scale *Concentration* and the items that loaded on each factor are given in Table 5.10 below.

**Table 5.10: Concentration – Pattern Matrix**

No.	Items	Factor	
		1	2
39	I am unable to concentrate well because of restlessness or moodiness.	0.618	
43	I find it hard to pay attention during lectures.	0.559	
55	I don't understand some course material because I don't listen carefully.	0.505	
46	I am distracted from my studies very easily.	0.387	
11	Problems outside my study context, cause me to neglect my studies.	0.373	
6	I find that during lectures I think of other things and don't really listen to what is being said.	0.260	-0.260
68	My mind wanders a lot when I study.		-0.661
61	I concentrate fully when studying.		-0.388

The different factors that loaded on each factor were considered and a descriptive label was then given to each of the two factors. Six items loaded on Factor 1 and two items

loaded on Factor 2. Factor 1 relates to whether a student is easily distracted and Factor 2 relates to the ability of students to concentrate while studying.

The interpretation of these factors and their items, is briefly explained below:

Factor 1: (Distractible).

Items 39, 43, 55, 46, 11 and 6.

Factor 2: (Ability to Concentrate While Studying).

Items 68 and 61.

According to Weinstein and Palmer (1990:5), *Concentration* relates to the self-regulation component of strategic learning and assesses the ability of students to direct and maintain their attention on academic tasks. This can be assessed by how easily a student gets distracted and whether students can direct their attention to school tasks (Weinstein & Palmer, 1990:6).

Although the division of this factor into two sub-factors makes theoretical sense, only the single factor, *Concentration*, as mentioned in the manual of the LASSI-HS (Weinstein & Palmer, 1990:6) will be used for the purposes of further statistical analyses in this study.

#### 5.3.1.6 Factor Analysis 6: Information Processing

The sixth scale, *Information Processing*, contains items addressing the use of mental imagery, verbal elaboration, comprehension monitoring and reasoning. The KMO value for Information Processing is 0.9 which is higher than the suggested minimum (see Par. 5.3.1.1). The Bartlett test of sphericity tests the null hypothesis and a value where Sig.  $\leq$  0.001 indicates that the null hypothesis may be rejected and that the variables are not completely uncorrelated (see Par.5.3.1.1). One factor that explained 44.20% of the total variance in the scale: *Information Processing*, was identified and the construct validity can thus be accepted. The communalities of the items varied between 0.23 and 0.49, indicating that some information of the items was not sufficiently explained by the extracted factors. Communalities refer to the percentage of variance of each item which is accounted for by the extracted factor.

As indicated in Table 5.11 below, only one factor emerged from the factor analysis.

**Table 5.11: Information Processing – Factor matrix**

No.	Items	Factor
40	I try to find relationships between what I am learning and what I already know.	0.698
67	I try to see how what I am studying would apply to my everyday living.	0.659
32	When I am studying a topic, I try to make everything fit together logically.	0.646
23	I translate what I am studying in my own words.	0.618
47	I try to relate what I am studying to my own experience.	0.596
12	I try to think through a topic and decide what I am supposed to learn from it rather than just read it over when studying.	0.563
76	I try to inter relate themes in what I am studying.	0.538
15	I learn new words of ideas by visualising a situation in which they occur.	0.484

According to Weinstein and Palmer (1990:4) *Information Processing* relates to the skill component of strategic learning and it assesses how well students' can use imagery, verbal elaboration, organisation strategies and reasoning skills as learning strategies to use new information and skills and to build bridges between what they know and what they are trying to remember and learn. This can be assessed by how well students summarise or paraphrase their class reading assignments and whether they try to relate what is being presented in class to their prior knowledge (Weinstein & Palmer, 1990:5).

These results in the Table 5.11 give evidence of acceptable construct validity for the scale *Information Processing*.

### 5.3.1.7 Factor Analysis 7: *Selecting Main Ideas*

The *Selecting Mains Ideas* scale addresses the ability of students to pick out important information for further study, and two factors were revealed by the factor analysis. The KMO value for *Selecting Main Ideas* is 0.6 which is equal to the suggested minimum (see Par. 5.3.1.1). The Bartlett test of sphericity tests the null hypothesis and a value where  $\text{Sig.} \leq 0.001$  indicates that the null hypothesis may be rejected and that the variables are not completely uncorrelated (see Par. 5.3.1.1). Two factors that explained 61.55% of the total variance in the scale: *Selecting Main Ideas* were identified and construct validity can

thus be accepted. The communalities of the items varied between 0.20 and 0.45, indicating that the information of some items was not sufficiently explained by the extracted factors. Communalities refer to the percentage of variance of each item which is accounted for by the two extracted factors.

The two factors which emerged from the confirmatory principal component factor analysis for the scale *Selecting Main Ideas* and the items that loaded on each factor, are given in Table 5.12 below.

**Table 5.12: Selecting Main Ideas – Pattern Matrix**

No.	Items	Factor	
		1	2
77	I have difficulty identifying the important points in my reading.	0.664	
72	Often when studying I seem to get lost in the details and can't see the forest for the trees.	0.624	
60	It is hard for me to decide what is important to underline in a text.	0.440	
2	I am able to distinguish between more important information and less important information during a lecture.		0.649
8	I try to identify the main points when I listen to lectures.		0.638

The different items that loaded on each factor were considered and a descriptive label was given to each of the two factors. Three items loaded on Factor 1 and two items loaded on Factor 2. Factor 1 relates to the Inability to Identify Important Points while Reading and Factor 2 relates to Ability to Identify Important Points while Listening.

The interpretation of these factors and their items, is briefly explained below:

Factor 1: (Inability to Identify Important Points while Reading).

Items 77, 72 and 60.

Factor 2: (Ability to Identify Important Points while Listening).

Items 2 and 8.

According to Weinstein & Palmer (1990:5), *Selecting Main Ideas* relates to the skill component of strategic learning and assesses the skills of students to identify important

information for further study from less important information and supporting details. This can be assessed by the ability of the student to identify key points in a lecture and by what the student decide is important to underline in a textbook. (Weinstein & Palmer, 1990:5).

Although the division of this factor into two sub factors makes theoretical sense, only the single factor *Selecting Main Ideas* as mentioned in the manual of the LASSI-HS (Weinstein & Palmer,1990:5) will be used for the purposes of further statistical analyses in this study.

### 5.3.1.8 Factor Analysis 8: Study Aids

The *Study Aids* scale examines the degree to which students create or use support techniques or materials to help them learn and remember new information, and two factors were revealed. The KMO value for Study Aids is 0.8 which is higher than the suggested minimum (see Par. 5.3.1.1). The Bartlett test of sphericity tests the null hypothesis and a value where Sig.  $\leq$  0.001 indicates that the null hypothesis may be rejected and that the variables are not completely uncorrelated (see Par. 5.3.1.1). Two factors that explained 47.11% of the variance in the scale: *Study Aids*, were identified and construct validity can be accepted. The communalities of the items varied between 0.08 and 0.42, indicating that the information of some items was not sufficiently explained by the extracted factors. Communalities refer to the percentage of variance of each item which is accounted for by the two extracted factors

The two factors which emerged from the confirmatory principal component factor analysis for the scale *Study Aids* and the items that loaded on each factor, are given in Table 5.13 below.

**Table 5.13: Study Aids – Pattern Matrix**

No.	Items	Factor	
		1	2
50	I make drawings or sketches to help me understand what I am studying.	0.691	
73	When they are available, I attend group review sessions.	0.599	
53	I make simple charts, diagrams or tables to summarise material in my courses.	0.524	

44	I key in on the first and/or last sentences of most paragraphs when reading my text.	0.254	
19	My underlining is helpful when I review text material.		0.602
24	I compare class notes with other students to make sure my notes are complete.	0.203	0.487
62	I use the chapter headings as a guide to identify important points in my reading.	0.300	0.464
7	I use special study aids, such as italics and headings that are in my textbook.		0.301

The different items that loaded on each factor were considered and a descriptive label was then given to each of the two factors. Four items loaded on Factor 1 and four items loaded on Factor 2. Factor 1 relates to the use or creation of visual techniques and Factor 2 relates to the use of the textbook and class notes in learning.

The interpretation of these factors and their items, is briefly explained below:

Factor 1: (Use or Creation of Visual Techniques).

Items 50, 73, 53 and 44.

Factor 2: (Use of the Textbook and Class Notes in Learning).

Items 19, 24, 62 and 7.

According to Weinstein and Palmer (1990:6), *Study Aids* relates to the self-regulation component of strategic learning and assesses the use of support techniques, materials or resources by students to help them learn and remember new information. This can be assessed by whether students complete practice exercises and whether they create or use organisational aids.

Although the division of this factor into two sub-factors makes theoretical sense, only the single factor *Study Aids*, as mentioned in the manual of the LASSI-HS (Weinstein & Palmer, 1990:6) will be used for the purposes of further statistical analyses in this study.

#### 5.3.1.9 Factor analysis 9: Self-testing

The *Self-testing* scale focuses on whether a student reviews and prepares for classes and tests. Most of the aspects deal with some aspect of comprehension monitoring and revealed only one factor. The KMO value for Self-testing is 0.8 which is higher than the

suggested minimum (see Par. 5.3.1.1). The Bartlett test of sphericity tests the null hypothesis and a value where Sig.  $\leq$  0.001 indicates that the null hypothesis may be rejected and that the variables are not completely uncorrelated (see Par. 5.3.1.1). One factor that explained 42.77% of the variance in the scale: *Self-testing*, was identified and construct validity can thus be accepted. The communalities of the items varied between 0.14 and 0.51, indicating that some information of the items was not sufficiently explained by the extracted factors. Communalities refer to the percentage of variance of each item which is accounted for by the factor.

As indicated in Table 5.14 below, only one factor emerged from the factor analysis.

**Table 5.14: Self-Testing – Factor matrix**

No.	Items	Factor
65	I test myself to be sure I know the material I have been studying.	0.711
17	When preparing for exams, I create questions that I think might be included.	0.700
4	After a class I review my notes to help me to understand the information.	0.652
21	I try to identify potential test questions when reviewing my class material.	0.585
37	I check to see if I understand what the lecturer is saying during the lecture.	0.580
70	I go over homework assignments when reviewing class materials.	0.547
26	Review my note before the next class.	0.518
30	I stop periodically while reading and mentally go over or review what was said.	0.374

According to Weinstein and Palmer (1990:5) *Self-testing* relates to the self-regulation component of strategic learning and assesses the use of reviewing and comprehension monitoring techniques by students to determine their level of understanding of the information or tasks to be learned. This can be assessed by whether students do revision before taking a test and whether they stop periodically while reading to review the content (Weinstein & Palmer, 1990:6).

These results in the Table 5.14 give evidence of acceptable construct validity for the scale *Self-Testing*.

### 5.3.1.10 Factor Analysis 10: Test Taking Strategies

The last scale *Test Taking Strategies* focused on the approaches used by students when preparing for and taking quizzes and tests, and revealed two factors. The KMO value for *Test Taking Strategies* is 0.8 which is higher than the suggested minimum (see Par. 5.3.1.1). The Bartlett test of sphericity tests the null hypothesis and a value where Sig.  $\leq$  0.001 indicates that the null hypothesis may be rejected and that the variables are not completely uncorrelated (see Par. 5.3.1.1). Two factors that explained 49.92% of the variance in the scale: *Test Taking Strategies*, were identified and construct validity can thus be accepted. The communalities of the items varied between 0.17 and 0.70, indicating that some information of the items was not sufficiently explained by the extracted factors. Communalities refer to the percentage of variance of each item which is accounted for by the two extracted factors.

The two factors which emerged from the confirmatory principal factor analysis for the scale *Self Testing Strategies* and the items that loaded on each factor are given in Table 5.15 below.

**Table 5.15: Test Taking Strategies – Pattern Matrix**

No.	Items	Factor	
		1	2
71	I have difficulty adapting my studying to different types of courses.	0.684	
34	When I study, I have trouble figuring out what to do to learn the material.	0.581	
59	When I take a test, I realize I have studied the wrong material.	0.575	
27	I am unable to summarise what I have just heard in a lecture or read in a textbook.	0.501	
52	I have trouble understanding just what a test question is asking.	0.376	
20	I do poorly in tests because I find it hard to plan my work within a short period of time.		-0.891
64	I memorise grammatical rules, technical terms, formulas, etc. Without understanding them.		-0.455
75	In taking tests, writing themes, etc. I find I have misunderstood what is wanted and lose points because of it.		-0.324

The different items that loaded on each factor were considered and a descriptive label was then given to each of the factors. Five items loaded on Factor 1 and three items loaded on Factor 2. Factor 1 relates to the Approach Towards Tests and Different Test Questions and Factor 2 relates to Test Preparation.

The interpretation of these factors and their items, is briefly explained below:

Factor 1: (Approach Towards Tests and Different Test Questions).

Items 71, 34, 59, 27 and 52.

Factor 2: (Test Preparation).

Items 20, 64 and 75.

According to Weinstein and Palmer (1990:4), *Test Taking Strategies* relates to the skill component of strategic learning and assesses the use of both test preparation and test taking strategies by students. This can be assessed by whether students know how to study for tests in different types of courses and whether they review their answers to essay questions (Weinstein & Palmer, 1990:5).

Although the division of this factor into two sub factors makes theoretical sense, only the single factor *Test Taking Strategies* as mentioned in the manual of the LASSI-HA (Weinstein & Palmer, 1990:4) will be used for the purposes of further statistical analyses in this study.

#### 5.3.1.11 Conclusion: Construct validity of the LASSI-HS

The results of the above factor analyses reported in Tables 5.6 to 5.15, confirm the construct validity of each of the ten LASSI-HS scales and therefore it can be deduced that the instrument is valid.

### 5.3.2 The reliability of the LASSI-HS

Different methods can be used to determine the reliability of measuring instruments. In this study the Cronbach-alpha coefficients were calculated to determine the internal consistency reliability. Internal consistency reliability refers to the level of conformity among the items that measure a specific construct.

The calculated Cronbach-alpha coefficients are presented in Table 5.16 below.

**Table 5.16: Calculated Cronbach-alpha coefficients for the different scales of the LASSI-HS (as administered to the study population)**

Scale	Calculated Cronbach-alpha coefficients (Study population)	Cronbach-alpha coefficients as reported in the LASSI-HS manual (Weinstein & Palmer, 1990:9-13)
Attitude	0.70	0.77
Motivation	0.70	0.84
Time Management	0.64	0.85
Anxiety	0.61	0.87
Concentration	0.71	0.86
Information Processing	0.82	0.84
Selecting Main Ideas	0.52	0.89
Study Aids	0.69	0.73
Self Testing	0.80	0.84
Test Taking Strategies	0.74	0.80

Considering the calculated Cronbach-alpha coefficients in Table 5.16 in comparison with the reported Cronbach-alpha coefficients in the LASSI-HS manual (Weinstein & Palmer, 1990:9-13), it can be concluded that in general the questionnaire has internal consistency reliability. When the items correlate strongly with one another, their internal consistency is high and should be near 1.0. If the items do not correlate with one another the internal consistency is lower and the Cronbach-alpha coefficient should be near 0.0.

According to George and Mallery (2009:231), the following scale can be used to interpret the reliability of the Alpha coefficients:  $\geq 90$  – high/excellent,  $\geq 80$  – good,  $\geq 70$  – acceptable,  $\geq 60$  – questionable,  $\geq 50$  – poor, and  $\leq 50$  – unacceptable. Although the scale *Selecting Main Ideas* has a relatively low alpha coefficient value ( $< 0.60$ ), all the individual items that contributed to the scale displayed a positive correlation with the total score and therefore contributed to the construct.

On the whole, the calculated reliability coefficients indicate that the LASSI-HS can be accepted as a reliable instrument.

### **5.3.3 Conclusion: Validity and reliability of the LASSI-HS**

When the results of the factor analyses and the calculated Cronbach-alpha coefficients are taken into consideration, it can be concluded that the LASSI-HS which was administered to the study population can be considered to be valid and reliable.

### **5.3.4 Validity and reliability of the GSAT**

The researcher is of the opinion that it is not necessary to conduct further factor analyses to prove the construct validity of the GSAT, nor to calculate Cronbach-alpha coefficients to prove the reliability of the GSAT, because it was standardised for the South African population and has proven to be a valid and reliable instrument in the South African context (see Par. 4.4.2.1.5).

## **5.4 Descriptive Statistics: First year students' performance on the LASSI-HS and the GSAT**

In Table 5.17 below, information is given about the performance of first year students in the LASSI-HS and the GSAT in terms of means, maximum and minimum scores and standard deviations. The students' LASSI- HS raw scores were converted to percentiles and means were calculated for the percentiles obtained on each of the LASSI-HS scales.

The students' raw scores on the GSAT were converted to stanines and means were calculated for the stanines obtained on GSAT Verbal, Non-verbal and Total.

Table 5.17 Descriptive statistics: First year students' performance in the LASSI-HS and GSAT

Psychometric Instrument	Descriptive statistics				
	Valid N	Mean	Minimum	Maximum	Standard Deviation
<b>LASSI-HS</b>					
Attitude	269	41.57	1.00	99.00	31.56
Motivation	269	43.69	1.00	99.00	29.82
Time management	269	70.02	1.00	99.00	22.08
Anxiety	269	47.51	1.00	99.00	24.54
Concentration	269	67.10	1.00	99.00	25.70
Information Processing	269	60.89	1.00	99.00	29.96
Selecting main ideas	269	45.45	1.00	99.00	29.01
Study aids	269	58.20	1.00	99.00	29.22
Self testing	269	63.74	1.00	99.00	30.51
Test taking strategies	269	37.41	1.00	99.00	30.17
<b>GSAT</b>					
GSAT verbal	270	3.71	1.00	9.00	1.59
GSAT non-verbal	270	2.73	1.00	9.00	1.32
GSAT Total	270	3.10	1.00	9.00	1.39

#### 5.4.1 Descriptive analysis of the LASSI-HS

The Skill component of strategic learning consists of *Information Processing*, *Selecting Main Ideas* and *Test Taking Strategies*. The different means for these individual scales give an indication that the students displayed above average *Information Processing Skills* (60.89%), but that they performed dismally in *Test Taking Strategies* (37.41%), and *Selecting Main Ideas* (45.45%). This implies that their test taking strategies were inadequate and they experienced problems with discerning between important information and less important information and supporting details while studying.

The Will component of strategic learning consists of *Anxiety*, *Attitude* and *Motivation*. The different means for the individual scales give an indication that the students

performed below average in all three of the scales: *Anxiety* (47.51%), *Attitude* (41.58%) and *Motivation* (43.69%). This implies that in general the students did not display a positive academic attitude towards and interest in, college education. It also seems that they lacked a strong enough desire to be academically successful. Their below average score for *Motivation* underscores the latter deduction and it indicates that the students' diligence, self-discipline and willingness to exert the necessary effort to complete academic requirements successfully, were lacking. Therefore it does not come as a surprise that *Anxiety* was below average, because this scale relates to the will component and assesses the degree to which students are concerned about their academic performance.

The Self-regulation component of strategic learning consists of *Concentration*, *Self-testing*, *Study-Aids* and *Time Management*. The different means for the scales give an indication that the students performed above average in all the scales: *Concentration* (67.10%), *Self-Testing* (63.74%), *Study-Aids* (58.20%) and *Time Management* (70.03%). This implies that the students could focus their attention on college and college related tasks and they could effectively maintain a high level of concentration. The above average score on *Self-testing* indicates that the students were aware of the importance of self testing and reviewing of study materials. Students were also able to create study aids that support and increase meaningful learning and retention, however, they might need some assistance to learn to use different types of study aids to be effective in the autonomous learning situation. Students were able to create schedules to effectively manage the available time for studying. They were also able to set goals and create plans to facilitate goal achievement.

#### **5.4.2 Descriptive analysis of the GSAT**

The mean stanine scores obtained on the GSAT (Verbal, Non-verbal and Total) can be described as low and therefore it can be deduced that in general, the group of first year students displayed low scholastic aptitude or academic intelligence which could explain the dismal academic success rates displayed in Table 5.5. However, this relationship will be examined further in the following paragraph.

## 5.5 The relationship between the different variables and academic success

In this section the relationship between the first year students' gender, age, LASSI-HS and GSAT results and their academic success (determined by receiving a certificate, or not at the end of their first year of study) will be examined.

Tests measuring statistical significance have a tendency to yield small p-values (Ellis & Steyn, 2003:51). The p-value gives the probability that the value attained could be obtained under the assumption that the null hypothesis is true (Ellis & Steyn, 2003:51). A small p-value (smaller than 0.05) is considered sufficient evidence that the result is significantly significant (Ellis & Steyn, 2003:51).

The researcher did not use a random sampling technique to select the first year students in this study, and as this study involved a study population, no assumption regarding the representativeness of the sample can be made. For this reason, as well as to determine the practical significance of results, effect sizes were calculated. Ellis and Steyn (2003:51) state that a valid way to comment on the practical significance is to measure the effect size or standardised difference between the means of two populations. This measure is independent of the units and sample sizes. The following guidelines for interpreting effect sizes are given:

- a) Small effect:  $d = 0.2$
- b) Medium effect:  $d = 0.5$  and
- c) Large effect:  $d = 0.8$  (Ellis & Steyn, 2003:53).

When  $d \geq 0.5$ , it is considered as an indication of practical significance, while  $d \geq 0.8$  is considered as an important difference in practice.

In order to determine whether there was a significant relationship between the different variables and academic success, the independent t-test was used. Information regarding the t-values, p-values and effect sizes are displayed in Table 5.18 below.

**Table 5.18 The relationship between different variables and academic success of the first year students**

Variable	Academic success: Receiving a Certificate (Yes/No)	N	Mean	Std. Deviation	t-value	Sig: p-value (2 tailed)	Effect Size d
Age	Yes	65	19.69	2.64	-0.78	0.44	0.10
	No	205	19.99	2.85			
Grade Mark Average	Yes	65	49.26	7.38	6.67	< 0.001	0.87
	No	205	42.03	8.30			
Attitude	Yes	65	43.68	32.19	0.61	0.55	0.09
	No	204	40.91	31.40			
Motivation	Yes	65	48.29	30.85	1.40	0.17	0.20
	No	204	42.23	29.51			
Time Management	Yes	65	68.32	24.02	-0.67	0.55	0.09
	No	204	70.57	21.46			
Anxiety	Yes	65	44.80	26.90	-0.96	0.34	0.13
	No	204	48.38	23.75			
Concentration	Yes	65	65.34	26.21	-0.63	0.53	0.09
	No	204	67.66	25.58			
Information Processing	Yes	64	64.55	28.98	1.15	0.26	0.16
	No	203	59.74	30.24			
Selecting Main Ideas	Yes	65	48.55	28.28	1.01	0.32	0.14
	No	204	44.46	29.25			
Study Aids	Yes	65	59.71	29.27	0.48	0.64	0.07
	No	204	57.72	29.26			
Self Testing	Yes	65	67.65	29.89	1.20	0.23	0.17
	No	204	62.49	30.68			
Test and Exam Strategies	Yes	65	34.74	30.19	-0.82	0.41	0.12
	No	204	38.26	30.13			
GSAT Non-Verbal	Yes	65	4.49	1.49	4.83	< 0.001	0.67
	No	205	3.46	1.54			
GSAT Verbal	Yes	65	3.28	1.29	3.95	< 0.001	0.56
	No	205	2.55	1.28			
GSAT Total	Yes	65	3.88	1.36	5.29	< 0.001	0.75
	No	205	2.86	1.31			

The d-values (effect sizes) in Table 5.18 indicate practically significant relationships between the following variables and academic success:

- Grade Mark Average ( $d = 0.87$ ):
- GSAT-Non verbal ( $d = 0.67$ )
- GSAT-Verbal ( $d = 0.56$ ), and
- GSAT-Total ( $d = 0.75$ ).

In other words, as far as the abovementioned variables are concerned, significant differences existed between the mean scores of students who were academically successful and unsuccessful (receiving a certificate, or not receiving a certificate) at the end of their first year of study. Therefore, one can deduce that the higher the Grade Mark Average and GSAT scores, the higher the academic success rate and vice versa.

The GSAT-Total is the combined score of the GSAT-Verbal and the GSAT-Non-verbal scores. It can thus be deduced that the GSAT-Total, which is also an indication of the student's scholastic ability or academic intelligence, is a significant predictor of academic success.

With reference to the different scales of the LASSI-HS, no practically significant differences were detected between the mean scores of students who received a certificate and those who did not. Thus, the deduction can be made that none of the individual scales of the LASSI-HS displayed a practically significant relationship to academic success, and therefore cannot be regarded as predictors of academic success. These results confirm that the LASSI-HS is a diagnostic and prescriptive measure, which is used to help students develop awareness of their strengths and weaknesses with regard to studying and learning, and should not be used as a screening test to predict academic success (Weinstein & Palmer, 1990:4).

As far as age is concerned, no significant difference ( $d=0.10$ ) was detected between the mean ages of students who received a certificate and those who did not. The deduction can therefore be made that there was no significant relationship between age and academic success and that for this study population age cannot be regarded as a predictor of academic success.

Table 5.19 reflects information regarding the relationship between the first year students' gender and their academic success (receiving a certificate or not receiving a certificate).

**Table 5.19 The relationship between gender and academic success**

Gender	Not receiving a Certificate	Receiving a Certificate	N	p-value
Male	109 (80.74%)	26 (19.26%)	135	0.074
Female	95 (71.43%)	38 (28.57%)	133	
Total	204	64	268	

The Chi-square value of 3.20 has resulted in a p-value of 0.074 which indicates that there was not a significant statistical relationship between gender and academic success. Cramer's V can be regarded as an effect size for cross tabulations indicating the strength of the association, where a value of:

- 0.10 indicates a small effect;
- 0.30 indicates a medium effect, and
- 0.50 indicates a large effect.

For gender, a Cramer's V-value of 0.109 was obtained, which is not practically significant. Thus it can be concluded that there was no relationship between gender and academic success and female students were not academically more successful than male students and vice versa.

#### *5.5.1.1 The relationship between the GSAT scores and Grade Mark Average*

In Table 5.20 below a correlation matrix presents the correlations between the GSAT scores and Grade Mark Average.

**Table 5.20 Correlations between GSAT scores and Grade Mark Average**

Variables	Grade mark Average	GSAT (Total)	GSAT (Verbal)	GSAT (Non verbal)
Grade mark Average	1.000	0.233	0.221	0.261
GSAT (Total)	0.233	1.000	0.776	0.739

GSAT (Verbal)	0.221	0.776	1.000	0.562
GSAT (Non verbal)	0.261	0.739	0.562	1.000

*r* ≈ 0.1 indicates a small correlation; *r* ≈ 0.3 indicates a medium correlation and *r* ≈ 0.5 indicates a large correlation

When the correlation coefficients in Table 5.20 are observed, large correlations exist between GSAT-Total and GSAT-Verbal (0.776) and between GSAT-Total and GSAT-Non-verbal (0.739). These large correlations will result in multicollinearity in a regression analysis so that only one GSAT variable, GSAT-Total, will be used for the purposes of regression analysis. The correlation coefficient between GSAT-Total and the Grade Mark Average is 0.233, which is acceptable and will not result in multicollinearity. Thus both variables, GSAT-Total and Grade Mark Average can be used as predictors in regression analysis.

### 5.5.2 Logistical Regressions

Logistic regression is a method for determining whether each of a set of independent variables (see Table 5.18) has a unique predictive relationship with the binary dependent variable (academic success) as measured by whether a certificate was received (yes/no). In order to identify the best predictors of academic success, logistical regressions with each of the variables separately and simultaneously entered in the model, as well as stepwise regression, were used.

In forward stepwise regression, the most important predictor was subsequently added to an empty model whereas in backward stepwise regression all the variables were included in the model and then in every subsequent step, the least important predictor of academic success was excluded. These procedures stopped when no other variables met the criterion of significantly predicting academic success.

In Table 5.21 the variables that predicted academic success of the study population, were each used in a separate logistic regression model.

**Table 5.21 Logistical regressions – for each separate predictors**

Predictor variable	p-value	Odds Ratio	95% CI for Exp(B)
GSAT-Total	$\leq 0.001$	1.494	[1.186:1.883]
Grade Mark Average	$\leq 0.001$	1.103	[1.063:1.144]

In statistics the odds of an event occurring, is the probability of the event occurring, divided by the probability of the event not occurring. The odds ratio indicates how much more likely it is that an increase of one unit in the predictor variable, will lead to academic success.

The odds ratios in Table 5.21 indicate that if the GSAT score of a student increases with one stanine unit, the chance to get a certificate will be 1.49 times more likely.

Likewise, if the grade mark average of a student increases with 1 percent, the chance of the student getting a certificate, will be 1.10 times more likely.

**Table 5.22 Logistical regressions – with both predictors entered simultaneously**

Predictor	p-value	Odds Ratio	95% CI for Exp(B)
GSAT –Total	$\leq 0.001$	1.091	[1.050:1.133]
Grade mark average	$\leq 0.001$	1.623	[1.276:2.064]

Stepwise forward and stepwise backward logistic regressions both give identical results to the logistic regression in Table 5.22 where GSAT-Total and Grade Mark Average were included simultaneously in the model. The results of the stepwise regression confirmed that both the GSAT-Total and Grade Mark Average were statistically significant predictors of academic success for the study population in the present study.

## **5.6 Summary of the results emanating from the empirical part of the research**

- None of the individual scales of the LASSI-HS demonstrated relationships of practical significance with academic success and therefore they cannot be regarded as predictors of academic success for the study population (see Table 5.18).

- There was no relationship of practical significance between age and academic success. Therefore age cannot be regarded as a predictor of academic success for the study population (Table 5.18).
- There was no practical significant relationship between gender and academic success. Therefore gender cannot be regarded as a predictor of academic success for the study population (see Table 5.19).
- Grade Mark Average and the GSAT-Total were the best predictors of academic success of the first year NCV (Level 2) students in this study population (see Tables 5.18, 5.21 and 5.22).

## **5.7 Discussion of results**

In the following paragraphs, the results emanating from the empirical investigation will be discussed.

### **5.7.1 The LASSI-HS as a predictor of academic success**

Students face many challenges during the transition from high school to the college academic environment. It is therefore important that the college staff and lecturers are able to identify students who are at risk of not being academically successful (receiving a certificate or not receiving a certificate) at the end of their first year of study.

The approaches to learning models commonly used in South Africa, are those of Biggs (Vermunt & Verloop, 1990:264) and Weinstein and Palmer (1999:5). These theorists believe that student learning takes place within a sphere of cognition and affect. Weinstein and Palmer (1990:5) include a third component in their theory known as the self-regulation component. Learning strategies are seen as particular combinations of learning activities students use to achieve their learning goals (Vermunt & Verloop, 1999:264). These include strategies that assist with the accommodation of learning and developing of skills important to the learning process, such as concentration during classes and managing study time effectively. Learning and study strategies are important factors in the success of first year college students and a popular tool for assessment of college level learning and study strategies has been the LASSI (Weinstein & Palmer,

1990:5). Weinstein and Palmer (1990:6) underline the strengths and weaknesses of student learning along ten specific categories or scales, e.g. attitude, motivation, time management, anxiety, concentration, information processing, selecting main ideas, study aids and self-testing, and are able to diagnose the exact strengths and weaknesses of student learning behaviour.

Although the non-cognitive factors (e.g. attitude, motivation, time management, anxiety) for each individual student, as measured by the LASSI-HS, were not valid predictors of academic success of first year NCV Level 2 students at the Potchefstroom and Klerksdorp Campuses of the Vuselela FET College, the information gathered could be used to facilitate the student support officer. This information could be used to coordinate and manage an academic orientation programme for all new first year NCV Level 2 students and can be used as a diagnostic tool by college support officers, to diagnose problem areas in the strategies that students use during their learning processes. The strengths and weaknesses that students show, give evidence of what can be improved, and what needs to be developed. Lecturing staff could also be involved in this programme to get involved with the students as soon as possible. The students could also be introduced to the various elective subjects of the different programmes during the induction and orientation programme before registering for a programme. During the orientation period, the student would have time to get acquainted with the FET College culture and its work ethics.

The adjustment and challenges that first year students face mostly develop during the formal lecture, when the student comes into contact with the institution as personified by the lecturer. It is here where the students encounter the content of new disciplines. Careful selection of the first year lecturers who can teach with confidence and passion and who has the education qualifications and influence should be appointed to teach and inspire these students. Smaller class groups and 80% class attendance should be included in the teaching and learning strategy.

It is the opinion of the researcher, that the LASSI-HS should not be used as part of the tests included during the registration period of first year students at the particular FET Colleges, but should rather be administered as part of the student support programme after the registration period. Students who have been out of school for some time could

benefit from the results of the LASSI-HS with regard to their study strategies during the learning process.

## **5.7.2 Age and gender as predictors of academic success.**

### *5.7.2.1 Age*

A study done by Ebenuwa-Okoh (2010:99) has shown that students' academic performance has been declining due to a number of school and non-school related demands. Variables such as self-esteem, test-anxiety, and locus of control, romantic relationships, financial status and age were all variables considered to be likely to affect the academic performance of students (Ebenuwa-Okoh, 2010:99). The results emanating from the study by Ebenuwa-Okoh (2010:102) concluded that age was not a significant predictor of academic success, but rather the students' character and behaviour. Similar studies done by Kyoshaba (2009:70) indicated that there is no relationship between the marks of more mature students and the academic performance of undergraduate students.

Similar results stemmed from the current study. Although age was not a predictor of academic success of first year NCV Level 2 students, the mean age is a reflection of the type of students who were targeted during the marketing campaign. They were students who had just completed their Grade 9 or higher qualifications at school, students who wished to improve their qualifications or NEETs (people who were Not in Employment, Education or Training) and were in possession of a Grade 9 or higher school qualification.

Further research could be directed at clarifying the relationship between age and prior knowledge, subject domains and learning activities.

It is the opinion of the researcher that due to the evidence of this study, the age of the participants should not be used as a selection tool during the registration period. Students who wish to register at an FET College, but who were Not Employed, in Education or Training (NEETs) and who met the minimum requirements for registration, could experience a gap between school and college. Pre-admission tests and procedures should be planned in such a way to assess the strengths and weaknesses of every individual

student to ensure that quality of learning can take place. The measuring of the cognitive and non-cognitive abilities of every first year student will result in early identification of particular weaknesses and would implicate knowledgeable counselling and support where needed.

#### *5.7.2.2 Gender*

Ebenuwa-Okoh (2010:102) conducted research on the gender of students and their academic performance and no relationship has been found between gender and academic performance. However, in a report by Zuze and Ready (2011:6) about the literacy gender gap in South African schools, it was found that gender gaps exists across the economic and cultural spectrum and in countries at different stages of development.

Literacy gender gaps in education are smaller than other gaps in education, such as gaps between high income and low income students, but the small increase in gender gaps have been shown to increase over time and may ultimately prevent students from fulfilling their potential (Zuze & Reddy, 2011:17). Students who struggle with reading will also be unable to cope in other subject areas including maths and science, because of the need to read textbooks (Zuze & Reddy, 2011:17).

Information about the first year students' gender was obtained from the GSAT answer forms. The information in Table 5.3 reflects an equal gender representation. The information in Table 5.19 indicates that there are more female students who received a certificate than male students, but there exists no significant relationship between gender and the prediction of academic success of first year NCV Level 2 students. It is therefore the opinion of the researcher, that gender should not be considered as a predictor variable during the selection process.

### **5.7.3 Grade mark average and GSAT-Total as predictors of academic success**

#### *5.7.3.1 Grade mark average*

Research has been done on the poor performance of high school learners in South Africa and numerous studies have linked the poor academic performance to socio-economic

problems, poverty and politics (Donald *et al*, 2006:185). Results of an investigation done by Bothma *et al*. (2004:74) confirmed the unpreparedness of prospective students, which was further aggravated by the grade mark average that created an unrealistic expectation of performance. In a study by Papier (2009:5) inadequate academic preparedness with regard to mathematical and language skills contribute to poor academic performance of college students and attrition.

In the present study grade mark average was a significant predictor of academic success and therefore should be used as a criterion during the selection process.

### 5.7.3.2 GSAT-Total

Although many tests of cognitive ability may be relevant in the South African context, the GSAT is a group test designed to measure academic intelligence within the South African context. The GSAT has been described as an objective instrument which determines reasoning or problem solving ability of students (Claassen *et al.*, 1993:4). The GSAT has been used as a screening test for admission purposes to secondary schooling and university and as a placement instrument and its predictive validity has been established (Claassen *et al.*, 1993:52).

The study therefore, confirmed that the GSAT-total score predicts the academic success of first year NCV Level 2 students significantly. Therefore the GSAT should be used as a selection instrument during the admission of first year students at FET Colleges.

## 5.8 Conclusions

On the basis of the results emanating from the empirical part of the research (see par. 5.6), the following conclusions were drawn with regard to the research questions stated in par. 4.2:

### **5.8.1 Conclusions with regard to research question 1.**

#### Research question 1:

*To what extent do the results obtained from psychometric and scholastic assessments contribute towards the prediction of academic success of first year NCV (Level2) students at an FET College?*

#### Conclusions:

- The results of the LASSI-HS did not contribute significantly towards the prediction of academic success of first year students.
- The results of the GSAT, in particular the GSAT-Total, contributed significantly towards the prediction of academic success of first year students.
- Grade mark average (calculated from the results on the students' last school reports) contributed significantly towards the prediction of academic success of the first year students.

### **5.8.2 Conclusion with regards to research question 2.**

#### Research Question 2:

*Which admission criteria are the best predictors of academic success of first year NCV (Level 2) students at an FET College?*

#### Conclusion:

- School results (grade mark average) and academic ability (GSAT-Total score), were the best predictors of academic success of first year students.

### **5.8.3 Conclusion with regards to research question 3.**

#### Research Question 3:

*Is there a significant relationship between gender and age and the academic success of first year NCV (Level 2) students at an FET College?*

#### Conclusion:

- There was no significant relationship between gender and age and the academic success of first year students.

## 5.9 Summary

In this chapter the results emanating from the empirical investigation were presented and discussed. On the basis thereof, conclusions were drawn. In Chapter 6, the study will be summarised and recommendations will be made.

## CHAPTER 6. SUMMARY AND RECOMMENDATIONS

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### 6.1 Introduction

The purpose of this chapter is twofold: firstly to provide a general overview of the dissertation by summarising the contents of each chapter and secondly, to make recommendations based on the results and conclusions emanating from the empirical part of the study.

#### 6.1.1 Summary of the different chapters

In chapter one, the reader was orientated towards the study and a rationale was provided for the research problem and aim. The research problem and aim were formally stated in terms of research questions and objectives and the research design and methodology were described. The ethical considerations that guided the research were identified and a brief chapter outline was provided.

Chapter 2 provided a literature review and theoretical exposition of the different factors that relate to academic success of first year students and clarified the diverse characteristics thereof. Cognitive factors relating to the academic success of first year students with specific reference to the FET Colleges were explained and discussed and different theories of intelligence were briefly summarised. The review described the development of tests and their uses in a variety of circumstances. Non-cognitive factors that facilitate learning were elaborated on. The relevant components of the Learning and Study Strategies Inventory – High School version (LASSI-HS) were explained. Personality, values, attitude and belief were the factors that were discussed. The last school report is a prominent concept with regard to admissions criteria at FET Colleges. The present South African context, with the many discrepancies among the cultural groups in terms of socio-economic and educational opportunities, was also discussed. Examples of intervention and support programmes that could be offered at FET Colleges in order to support students to meet the academic demands of the College were briefly mentioned. Chapter 2 concluded with the clarification of the meaning of the characteristics that predict academic success within the present South African context.

Chapter 3 examined the changes that have taken place in the South African education landscape with specific reference to the changes in Higher Education (HE) and Further Education and Training (FET). In this regard, reference was made to legislation and the introduction of FET Colleges in an attempt to enhance the vocational skills development in South Africa. It was further explained that the National Certificate Vocational (NCV) has been introduced as the backbone of the FET College programmes in order to alleviate skills shortages and unemployment among South African Youth. The reasons for the poor throughput rates at FET Colleges were discussed with reference to factors that proved to be problematic in the student admission and selection processes at FET Colleges. Factors that could impede the academic progress and success rates of students at FET Colleges were highlighted and alternatives to consider in intervention programmes for FET students were identified. The chapter concluded with a proposed pathways model for Higher Education and Training (HET) in South Africa.

In Chapter 4, the research design and methodology that were followed in the empirical part of the research were discussed. Information was given about the study population and the data collection instruments and data collection procedure were described. The statistical techniques that were employed for the purposes of data analysis were mentioned.

In Chapter 5 the results were presented and discussed. On the basis thereof, conclusions were drawn.

## **6.2 Recommendations**

The aim of the research was to determine which would be the best predictors of academic success of first year NCV Level 2 Students at FET Colleges. The main conclusion was that:

School results (Grade Mark Average) and academic ability (GSAT-Total score) were the best predictors of academic success of the first year students.

These results are an indication that the higher the students' school results and the higher their academic ability, the higher the likelihood that they will achieve better results at first year FET level. The GSAT-Total is not only a test of academic ability, but also of academic potential. The results of the study population indicated that the academic potential of the students, is poor and it subsequently reflected in the below average school results (grade mark average). These results also relate to the students' poor scholastic backgrounds and inferior school education which lead to their under-preparedness to meet the academic demands of FET colleges. Students who wished to register at an FET College, but who were Not Employed, in Education or Training (NEETs) could experience a gap between school and college. As a matter of fact, it seems that FET Colleges have now become the dumping grounds of school dropouts and people who do not have the potential to be academically successful. If this is the case, then FET colleges will never succeed in their quest to enhance the vocational skills of young people in South Africa and it is then a waste of taxpayers' money.

Pre-admission tests and procedures should be planned in such a way to assess the strengths and weaknesses of every individual student to ensure that quality of learning can take place. The measuring of the cognitive and non-cognitive abilities of every first year student could give early diagnosis of any deficits and would implicate knowledgeable counselling and support where needed. In the current research, only the results of the GSAT, LASSI-HS, last school results and gender and age were used. In order to obtain a more holistic understanding of the students and their potential, the results of other psychological instruments should also be used in the assessment process and more detailed biographical information pertaining to the scholastic background and socio-economic status of the individual student should be acquired and considered. In this regard an instrument such as *The Student Readiness Inventory (SRI)* (see par. 3.7) of Robbins *et al.*(2006:599), could also be considered as an instrument to determine prospective students' psycho-social readiness to be admitted to a FET college .

The recommendations contained in the proposed pathways model for Higher Education and Training in South Africa (Cosser (Cosser, 2010a:13, Cosser, 2010b) should also be strongly considered, in order to span the bridge between school and FET College education (see par. 3.10).

## **6.2.1 Recommendations for the Department of Education**

The following recommendations are made for the Department of Education to enhance the quality of education in schools and FET Colleges:

### *6.2.1.1 Recommendations to enhance the quality of education in schools*

- The Department of Education (DoE) should ensure that the subject assessment guidelines comply with policy documents and that instructions with regard to school assessments are clear and consistent.
- Subject specialists should not have the authority to amend national subject assessment guidelines at school district levels.
- The Department of Education should place more emphasis on regional meetings where educators from the different schools can compare memoranda and reach consensus on the allocation of the marks.
- The academic standards in the GET Band should be raised in general to meet the academic requirements of the FET Band.
- Greater emphasis should be placed on vocational skills training in the curriculum of the GET Band.
- Better vocational/career guidance should be offered to learners in the GET Band.
- More departmental support must be provided to teachers and learners from disadvantaged schools.

### *6.2.1.2 Recommendations to enhance the quality of education at FET Colleges*

- The Department of Education should re-think the entrance requirements for the NCV programme at a FET College, as a Grade 9 certificate seems to be inadequate for a student to cope with the academic demands of the first year NCV certificate.
- The Department of Education should make bridging programmes available to first year students at FET Colleges who do not meet the admission requirements.
- Financial support should be provided to low-income students so that they can attend full-time classes instead of part-time classes.

- FET Colleges should provide counselling and mentoring to all first year students who are in need thereof.
- At least one registered counsellor should be appointed at FET Colleges, who can render counselling to students when necessary.
- The Department of Education should make academic support and further training opportunities available to lecturers who do not possess the proper qualifications to teach “new” subjects in the NCV programmes.
- The Department of Education should rethink the qualification requirements of FET College lecturers.

### **6.2.2 Recommendations for FET Colleges**

The following recommendations to FET Colleges may result in higher pass rates of first year students:

- Cut-off points for admission requirements based on school results and IQ testing should be uniformly applied and all first year students who wish to register for NCV programmes, must meet these admission requirements.
- Bridging courses should be developed and offered to those students who do not meet the minimum entrance requirements. On successful completion of these bridging courses, students may be admitted to NCV programmes.
- Academic literacy courses should be offered to students who experience problems with reading and writing.
- In addition to the implementation of selection criteria, first year students must have access to programme advisors or student liaison officers who can assist them to make the most appropriate study programme choices.
- FET Colleges need to employ dedicated student liaison officers who can assist students with non-academic issues which may negatively impact on their academic achievement and progress.
- Student liaison officers at FET colleges should continuously monitor students’ academic achievement and progress and immediately intervene and render assistance when a student’s achievement and progress do not meet the expected academic standards.

- FET Colleges must identify ways and opportunities for students to apply their newly acquired knowledge and skills in the workplace or in simulated work environments so that the successful application of course content can motivate them to complete their course of study.
- FET Colleges that lack the relevant infrastructure or expertise to offer some of the programmes, could use the infrastructure and expertise of neighbouring education institutions to train the students more effectively.
- Formative and summative assessments should include a variety of interactive activities that engage the learner in analysing, integrating and applying course content to ‘real world’ problems, case studies or simulated situations.
- Computer skills are life skills and it is therefore vital that all first year students have access to information technology for the purposes of studying, designing, conducting research or communication.
- College management should also pay particular attention to staff training, motivation and development, This can be achieved by ensuring that:
  - college management motivate, support and recognise the achievements of college staff and nurture a culture of excellence,
  - college policies and strategies are developed, reviewed and updated to accommodate the expectations of all stakeholders,
  - staff members’ needs in terms of knowledge and competencies are identified, developed and sustained, and
  - staff members are involved and empowered to participate fully in all college affairs.

### **6.2.3 Recommendations to schools**

- The Grade 9 curriculum should be strengthened to meet the academic demands of the NCV (Level 2) certificate. This should include lifting the academic standard of the subjects, as well as the standard of assessments.
- Schools must identify learners who experience learning problems or barriers to learning at an early age, and offer the necessary remedial assistance to them, because it is often too late or time consuming to offer such assistance to students at FET Colleges.

- Learners should receive career guidance from their primary school years onwards so that they are able to make realistic study and career choices when they leave school and that they do not end up at FET colleges without having any idea about what they want to study.
- Schools and teachers need to take responsibility for the academic performance of learners and stop shifting the blame to a lack of equipment, a lack of textbooks, insufficient training, or other excuses. Although these are all relevant causes of scholastic underachievement, many disadvantaged schools and teachers in similar circumstances manage to achieve excellent academic results.

#### **6.2.4 Recommendations for further research**

The current study focussed on factors that contribute towards the prediction of academic success of first year NCV (Level 2) students at two campuses of a particular FET College in the North-West Province. Therefore, it is recommended that a national study of this kind should be conducted among the other FET Colleges in the different provinces of South Africa.

In order to obtain a holistic understanding of the different variables that may influence the academic success of first year students at FET Colleges, other variables such as socio-economic status, home and school backgrounds, personality, self-concept, vocational interests, values and career maturity should also be considered in the prediction of academic success.

### **6.3 Concluding thoughts**

The findings of this study indicated that the academic success of first year students is dependent on the quality of their school education as well as their academic potential.

However, given the generally poor results that South African public schools have achieved in the past, this leaves us with a challenge that is not easily solved. Most public schools in South Africa have a dismal record with regard to adequacy and quality of the education that learners have been receiving. This has been confirmed by the poor showing of South African schools in the internationally comparative PIRLS and TIMSS surveys

(Timms & Pirls, 2012). In order for FET students to achieve academic success it is of major importance that the quality of their school education should be optimised. Conversely, this implies that if learners in South Africa continue to receive poor quality education during the GET phase of their education, it is not likely that they will achieve academic success during the FET phase of their studies.

Although much can be done to manage FET colleges proficiently and to offer professional and adequate support to FET students, it cannot realistically be expected of FET colleges to remedy the deep-rooted shortcomings of GET education or to rectify the structural inadequacies of the education system. FET colleges fulfil an important niche of providing essential technical skills and competencies for students. There is a dire need in the developing economy of South Africa for employees that have adequately mastered such skills and levels of proficiency. It is not sufficient to focus only on the individual student or a particular FET institution when the underlying root of the problem might be an inadequate academic grounding the students receive in schools. It therefore stands to reason that in addition to specific management, training, teaching and students support interventions that may be taken to enhance the academic successes of first year FET students, a holistic and co-operative approach is required to address the shortcomings of GET education in order to optimise the potential for academic success of students in the subsequent FET phase of their education.

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**Appendix A: Letter requesting the CEO of the Vuselela FET College in North West permission to conduct the research**



NORTH-WEST UNIVERSITY  
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NOORDWES-UNIVERSITEIT  
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Dr MD Mochwanaesi  
Vuselela FET College  
Corporate Centre  
Klerksdorp

23 March 2009

Dear Sir

**PERMISSION TO CONDUCT RESEARCH AT VUSELELA FET COLLEGES: MRS C SMIT**

The above-mentioned person is a registered MEd student in the Faculty of Education Sciences of the North-West University (Potchefstroom Campus).

I am the supervisor of her study, titled: *The prediction of academic success of first year (level 2) NCV students*. The aim of the study is to identify the best predictors of academic success for students who register for the NCV-level 2 courses at the Vuselela FET College (Potchefstroom and Klerksdorp campuses).

For the purposes of her research, Mrs. Smit needs to conduct an analysis of the placement test and academic results of those students who registered for the NCV-level 2 courses in 2007 and 2008.

Mrs. Smit will adhere to all the ethical research requirements in her research and no person or institution will be identified in her research report.

I trust that this request will meet your favorable consideration and that you will grant the necessary permission to Mrs. Smit.

Thank you in anticipation

Yours sincerely

A handwritten signature in cursive script that reads "L. W. Meyer".

Prof LW Meyer  
Programme Leader: MEd & PhD

Van Alphen Street 20  
BAILLIE PARK  
2526  
Tel (018) 299 4772 / 082 8764408  
Email 20223587@nwu.ac.za  
24 February 2009

Cc: Mr. Smith; Dr. Oosthuizen

DR MD Mochwanaesi  
Vuselela FET College  
Corporate Centre  
KLERKSDORP

Dear Sir

**REQUEST FOR PERMISSION TO CONDUCT RESEARCH AT THE POTCHEFSTROOM  
CAMPUS OF THE VUSELELA COLLEGE.**

I hereby request permission to conduct research at the Potchefstroom and/or Klerkdorp campus of the Vuselela College in Northwest. I am student at the Northwest University, Potchefstroom campus and the title of my M.Ed dissertation is: "The prediction of academic success of first year (level 2) NCV students."

The research method will entail analysis of the placement test and academic results of 300 students who had registered for the NCV-level 2 course in 2007 and 2008. The content outcome will be confidential and anonymous.

The purpose of the study is to find the best predictor of academic success in the battery of tests currently used at the college. Should the Vuselela FET College be interested in the findings and recommendations, it will be made available as required.

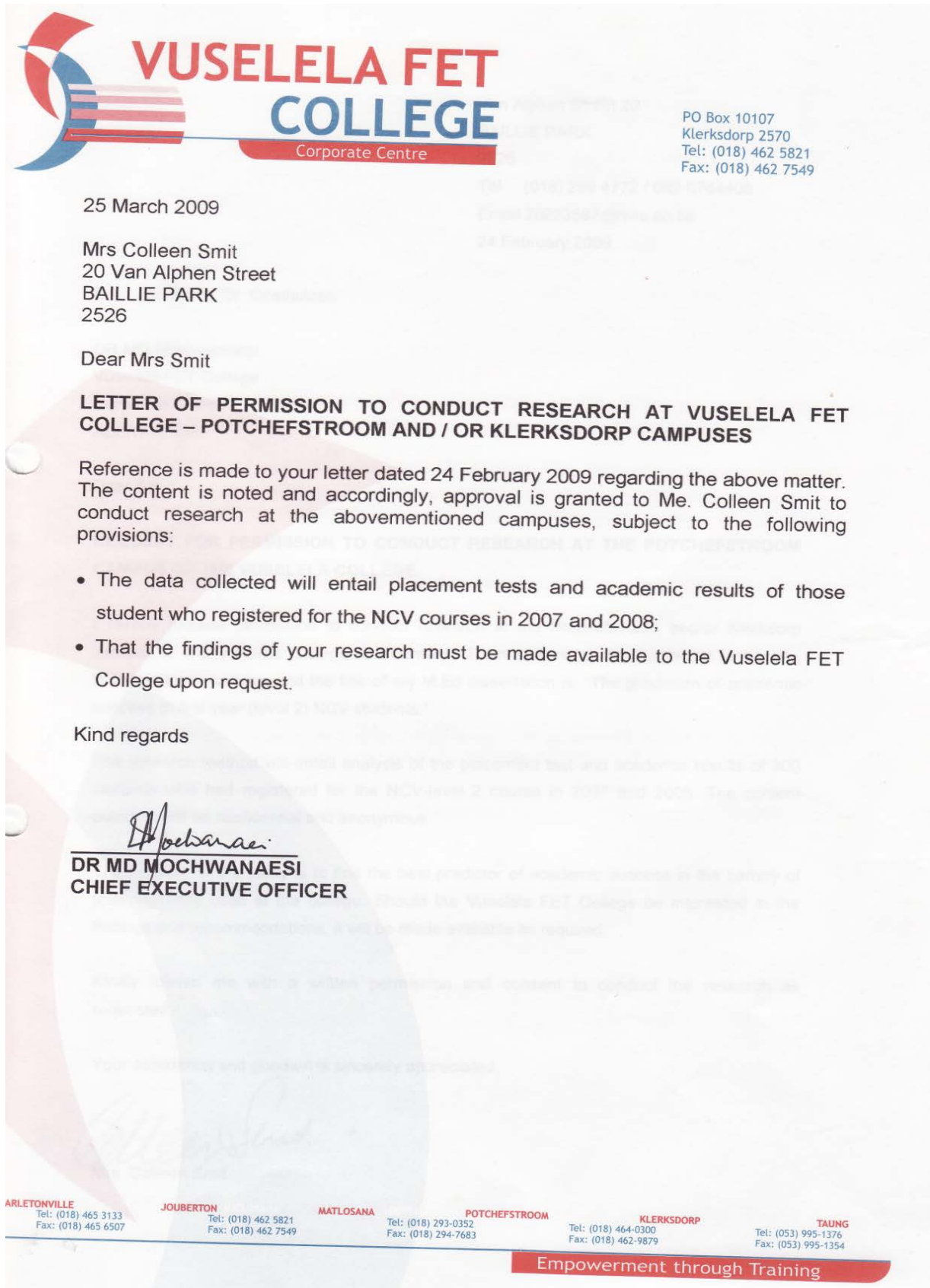
Kindly furnish me with a written permission and consent to conduct the research as requested.

Your assistance and goodwill is sincerely appreciated.



Mrs. Colleen Smit

**Appendix B: Letter from the CEO of the Vuselela FET College in North West granting permission to conduct the research.**





**Appendix D: Confirmation by the Statistical Consultation Services of the North-West University, Potchefstroom Campus.**



Privaatsak X6001 Potchefstroom 2520  
Tel (018) 299 1111 Faks (018) 299 2799  
<http://www.puk.ac.za>

**Statistiese Konsultasiediens**

Tel: (018) 299 2016

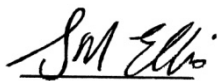
Faks: (018) 299 2557

22 Oktober 2012

**Re: Verhandeling Me C Smit, studentenommer 20223587**

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

Vriendelike groete



**Dr S M Ellis Pr Sci Nat**  
**Hoof: Statistiese Konsultasiediens**